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Permutative Genius in Tala-(Prastara) in Indian Music

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भारतनिधि, करौंदी
वाराणसी-5

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Prof. Prem Lata Sharma

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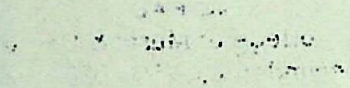

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PERMUTATIVE GENIUS IN TALA (-PRASTARA) IN INDIAN MUSIC

अ : 1/2
आम्नाय-ग्रन्थालय,
भरतनिधि, करौंदी
वाराणसी-5

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TELUGU UNIVERSITY
HYDERABAD
1992

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Sri Akella Mallikarjuna Sharma.

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PREFACE

The Telugu University is a unique educational institution established in 1985 under an Act of the State Legislature of Andhra Pradesh for the growth and promotion of Telugu Language, Literature and Culture. It has three campuses in Hyderabad, Srisailam and Rajahmundry.

The Telugu University Act provides for six Schools and five centres. The courses of study in the University, at present, include Literature, Comparative Literature, Applied Linguistics, History Culture, Archaeology, Journalism, Karnatak Music, Kuchipudi Dance, Instrumental Music, Folk Arts, Sculpture and Astrology.

One of the Schools of the University is devoted to Fine Arts, of which the Department of Music is an important part. The Department imparts teaching in Karnatak Music leading to Graduation and Post-Graduation.

Perhaps no other Indian language has so much of musical lore as Telugu. The very pronunciation of Telugu sounds musical and that is why it is called 'Italian of the East'. The contribution of the Telugu language for the development of Music in South India is beyond comparison.

The present book 'Permutative genius in Tala (-Prastara) in Indian Music is written by Sri Akella Mallikarjuna Sharma. This is an important work on Music. Music is a valued component of our Indian heritage. Raga and Tala are essential characteristics of the Indian Music. One of the ten elements of Tala is Prastara which indicates the process of permutation and indeed it is quite complex. Sri Mallikarjuna Sharma has done a remarkable research on various aspects of Tala with particular reference to Prastara. The present book is a testimony to his endeavours. I congratulate the author for producing this useful treatise on Music.

The Telugu University is happy to make this book available to students of Music as well as Music lovers.

PROF. C. NARAYANA REDDY
Vice-Chancellor
Telugu University

Hyderabad
16-7-1992

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Date : 21-2-1989.

FORE - WORD

Every culture may be finally analysed into an irreducibly small number of concepts and values which distinguish it from its compeers. The multiple modes of expression of a given culture are alternative routes to its self expresion and result by the variation, recurrence and permutation of the self same concepts and values at different points in the spatiotemporal coordinates of the culture. These last therefore operate in every such mode of expression at two levels : 1) in their foundational, original form at the roots and 2) in their transformed forms which are immediate to the specific expression at the level of stimulation, motivation and articulation. Thus its theory consists of a never-changing infrastructure and an ever-changing superstructure. Music, like all art is a growing, dynamic organism. Its discipline is descriptive, not prescriptive.

In any discipline involving human endeavour, the aim of theory is to provide a matrix and apparatus which 1) comprehends the entirety of practice 2) explains the empirical data, facts, functioning and techniques underlying such practice and 3) predicts future events and trends. This is true of the arts also. Art experience, in its autonomy can neither be translated nor extrapolated. But the different art reveal some common attributes in their symbolic material and in their modi operandi. Also, in its heteronomy art experience is ramified into several aspects and

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disciplines Therefore, the study of such experience admits of a reductionistic analysis and an interdisciplinal approach.

Among the many interdisciplinal correlates of music, mathematics and metre (prosody) may be mentioned in the context of the present work. Mathematical techniques, especially permutation and combination are found applied in both Sangeeta and Chandahshastra in an elaborate and perfected state for well over a thousand years. The genius of these theorists lies in 1) enunciating the rules in an aphoristic, yet lucid and unambiguous style 2) developing schemes of comprehensive, yet compact schemes of tabulation 3) reducing such schemes to the simplest arithmetical operations and 4) revealing highly pragmatic applications for such purely theoretical techniques.

Permutation refers in mathematics to a scheme or tabulation of systematic arrangement of a set of things in every possible order ; it also refers to any one such arrangement i. e., any one possible order of arrangement of a given number of things taken from a given number. This has been known in India as prastara (lit. extension, expansion) from about two thousand years. In metrics (Chandahshastra) it signifies a representation or enumeration of all the possible combinations of a certain given number of laghus (short syllables) and gurus (long syllables) in a metre. Though prastara is a general mathematical concept, it is probable that music borrowed it and its cognate concepts and techniques from metrics. The science of metrics has developed in India six theoretical tools to exact knowledge of the various mathematical aspests of metres under the collective name Shat-pratyaya. They enable the student to determine the prosodial type to which a given metrical form belongs, its serial number in a scheme of systematic tabulation, the number of metres which are possible or may be derived from each type, their exact forms etc. These tools are pra-

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stara, nashta, uddishta, eka-dvyadi-la-ga-kriya, sankhyana and adhvayoga. Of these, prastara means the expansion of a prototype metrical structure into every possible variation according to principles of permumutation. Thus, the vedic metrical prototypes from ukta to utkrti consisting of 1, 2, 3, 4 ..... 26 syllables per each of four feet respectively have 2, 4, 8, 16, 32 ..... 67108864 possible different arrangements respectively. Gayatri, for example with six syllables for foot has sixty-four permutations. Each of these is also called prastara. Prototypes with more syllables than 26 are called Malavrittas. Eight kinds of prastara viz., suchi, meru, pataka, samudra, viparitasamudra, patala, shalmali and viparitashalmali are described in Chandahshastra These are alternative routes to permutation.

The method of finding out the actual form or arrangement given its serial number in the tabulation is called Nashta For example, which is the metre corresponding to serial number 355799 (out of a total of 1048576) the prototype Krtichandas (consisting of 20 syllables per foot) Nashta enables to find out that it is composed of gllglglllglllglglg (l =laghu, g=guru) i.e , the Utpalamala metre. Uddishta pratyaya is the reverse of this. It enables us to find out the serial number of the metre in the tables of its composition is given Thus, if the foregoing composition of Utpalamala metre is given, Uddishta enables to find out that its serial number in the prastara tables is 355799. The next to pratyayas are classificatory in scope. Eka-dvyadi-la-ga-kriya teaches us to determine the number of permutations in a given prototype containing 1, 2. 3 ... . laghus. If the total number of syllables is 'n', then the number of permutations containing gurus would be correspondingly n-1, n-2, n-3 .... Thus, this method enables us to break up to the total number of permutations into those containing given numbers of its components. It is thus possible to say that in the Ushnik metre (containing 7 sylla-

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bles per foot) there are metrical structures one each containing all laghus or all gurus, 7 containing one laghu or six laghus, 21 containing two or five laghus and 35 containing three or four laghus, thus totalling 128. This may also be expressed thus: the number of permutations containing 7, 6, 5, 4, 3, 2, 1, or O gurus or laghus are 1, 7, 21, 35, 35, 21, 7 and 1 respectively. Sankhyana pratyaya enables the student to find out the number of permutations of samavrtta, ardhasama or vishamavrttas possible in a given prototype, its predecessor or successor. Adhvayoga is not, in reality, a pratyaya of metrics but is concerned with spatial computation. It answers the question, assuming uniform spacing in both writing and gaps, what is the space required to write horizontally a given metre?

Indian music is indebted to Chandahshastra for numerous models. The following among others may be mentioned : the concepts and relative proportions of temporal units laghu, guru and pluta ; rhythm structures without a tala frame as in tana ; in Karnataka music ; syllabic triads (varnagana) such as ma-gana are employed to describe or define talas ; both trisyllabic (varnagana) and moraic (matragana) structural units are found used in early and medieval music compositions ; elaborate rules were framed for the use of specific single or double ganas at the beginning of the composition with promise of desirable fruits and warning of undesirable effects accompanying such usage. Many songs were named after the metre in which they were prescribed to be set e. g., hayalila, kraunchapada, arya, dvipatha, kalahamsa, totaka, jhampata, paddhadi etc.; prastara techniques are used from very early times in tabulating shuddha, and kuta tanas, murchana, melakartas in Karnataka music and in the deshi talas. Musicology has adapted corresponding techniques from Chandahshastra to accommodate specific situation and requirements.

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In the context of tala only five pratyayas viz., prastara, sankhya, nashta, uddishta and patala are found adequate. Their connotations correspond to those in Samskrita metrics. A known arrangement of the angas (druta, laghu, guru, pluta and rarely kakapada, and in the modern context anudruta) fixed in number and order, is taken as a prototype. The structure and total time span of such a prototype is thus fixed and constant. Permutations of this are then obtained (and tabulated) by systematic replacement of an anga (stuctural unit) by a progressively smaller one until in the final permutation the prototype is reduced to only (an appropriate number of) the lowest anga (i. e., druta (in ancient parlance) or anudruta (in modern parlance) in Karnataka music). Theoretical texts have described the following pratyaya varieties : prastara, sankhya, nashta, uddishta, patala, sarva-patala, drutameru, drutameru-nashta, druta-meru-uddishta, laghumeru, laghumeru - nashta, laghu- meru-uddishta, gurumeru, gurumeru-nashta, gurumeru-uddishta, plutameru, plutameru-nashta, plutameru-uddishta, samyogameru, khanda-prastara and akhanda-prastara. The theory of talaprastara continued to be actively studied in India till comparatively recently. For intance, Sudhakalasha adds in 1350 A. D. the prastara genre called kalitha in his Sangeetopanishatsaroddhara; Pundarika Vitthala adds in his Nartananirnaya the varieties of pratyaya called malaprastara, viparita nashta-uddishta, drutahara nashta-uddishta as well as nashta-uddishtas above and below medial forms; greatly simplifying some earlier techniques and also offering some new alternative routes; Laksminarayana extends the pratyayas to anudruta and virama in his Sangeetasuryodaya; Poluri Govindakavi extends prastara to the five laghu-jatis in his Taladashapranapradeepika. Authors such as K. V. Srinivasa Iyyengar, Tacchur Singaracharya Brothers and Tenugupeta Venkataramanayya in the beginning of the 20 the century have revealed familiarity with the talapratyaya.

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In the pretext of 'melodiousness' and popularity, scholarship in the practice of music is being unfortunately allowed to wane at the present time. Technique, virtuosity and scholarship, when mastered and applied with effortless ease and grace promote excellence and highest creative activity in music. Individual caprice, eccentricity and mannerisms should not be confounded with genius or brilliance. Genius assumes a deep broad base of profound, continuous, conscious learning which is intensified and sublimated to the subconscious level.

When viewed in the light of the foregoing, the work of Sangeeta Vidwan Akella Mallikarjuna Sharma gains a special significance. He is a pioneer in the modern studies of talapratyaya and is indeed a genius of our times. With indefatigable zeal, patience and perseverance, with indomitable determination, with a total, single-minded devotion and dedication Sri Sharma has unravelled the mysteries of the talapratyaya in such minute detail that he has been able even to correct some inaccuracies in exposition and fact of great authors of the past. He has clearly shown the enduring relevance of these pratyayas in the form of many applications to the practice of music (and dance). He deserves the congratulation, admiration, respect and gratitude of every one who is interested in the promotion of the highest ideals of Indian music and Indian culture.

Indian culture is a garden; Indian music is a Sanatana Tree therein; the quality and quantity of its flowers and fruits depend on how deep, strong and far-reaching are its roots. Sri Sharma has done much to deepen and strengthen these hoary roots and is worthy of emulation.

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I hope that this scholarly work-which needs to be studied slowly, steadily and patiently - will be welcomed with enthusiasm by discerning musicians, musicologists and music lovers.

Trayeelakshmi,
Mysore,
21-2-1989.

R. SATHYANARAYANA.

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PREFACE

Fine arts play a very important role in promoting the human culture and progress. They chasten the human minds and help them to lead fuller and happier lives. Life will become dull, insipid, un interesting and bereft of all charms if fine arts are not allowed to prosper and grow.

Among the fine arts, while the visual arts like painting, sculpture and architecture appeal through the medium of the eye, the poetry and music appeal through the medium of ear.

According to the ancient Sanskrit Sloka :

"संगीतमपि साहित्यं सरस्वत्यास्तनद्वयं
एकमापात मधुरं अन्यथालोचनामृतं"

"Music and poetry are the two breasts of Saraswathi, the Goddess of Learning. Whereas music pleases the moment one hears it, poetry gives pleasure only after one contemplates on it."

Music is the language of emotion. In the history of human culture music is the earliest and finest of the Fine Arts. Music is of universal appeal influencing the man and the beast, the old and the infant and the scholar and the lay person alike. Music is a veritable elixir and has the unique capacity of giving one the much needed tranaquility the mental peace.

Music is both art (Kala) and a science (Shastra). Its study and practice results in the development of the intellectual and the soul. According to the Sloka:

"त्रिवर्ग फलदास्स दानयज्ञर्वे जपादयः
एकसंगीत विज्ञानं चतुर्वर्ग फलप्रदं"

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"gifts, holy sacrifices and prayers lead to the realisation of Dharma, Artha and Kama, the three-fold desires. But musical knowledge alone is capable of bestowing the fruits of all the four Purusharthas : Dharma, Artha, Kama and Moksha" and according to the Sloka:

"वीणावादन तत्वज्ञः श्रुति जाति विशारदः
तालज्ञश्चाप्रयासेन मोक्षमार्गं नियच्छति"

"One who is well-versed in Veena-play, one who is an adept in varieties of Shrutis and who is an adept in Tala ; they all attain salvation without effort."

Music has played great part in the life of the Indian people and has entered the hearts of all people by being the instrument through which religion and philosophy have pervaded the land. Whether in drama, dance or on the concert stage, in the home, in the temples, in the fields and in the lives of the peasant, the king or the householder, music gave richness to our civilisation and culture.

In the systems of music of the world, while the western solfa system had the heritage of nearly 1000 years, the Indian solfa system, being the oldest upon earth, had the heritage of more than 4000 years. The famous Kudimiamalai inscriptions on music were written in 7th century A. D.

Great musicians carried on their traditions for which we must be grateful to the Indian rulers and other noblemen. In South India this tradition has for tunately survived in a greater measure than any where else in the country because almost every child was taught the beautiful compositions of our great composers and this helped them to appreciate music. Thus, while great musicians, on one hand, strived hard to pass on the cultural heritage of the compositions of great composers to the next generations, great scholars, on the other hand, strived hard to record

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them in the books written by them to pass on the traditional techniques of the Sacred Fine Art, Music, to the next generations.

According to the Saint composer, Thyagaraja (1767-1847), the first and revered as the greatest of the musical Trinity :

"संगीत ज्ञानमु सारूप्य सौख्यदमेमनसा-मुखारिरागा-आदिताल"

—— knowledge of the science of music conduces to Bliss Divine. Beethoven (1770-1827), the great composer of Europe called music a revelation higher than all science and philosophy.

The student of mathematics will find the practical application of many of the concepts, series, progressions and formulae of mathematics, in music. The primordial scale of Indian music was found to take notes of correct and well recognised musical intervals. In the same manner there is an order of rhythm in all things pertaining to nature. There is rhythm in the movements of stellar bodies. There is rhythm in the pulse of the hand. In music all the rhythmical forms have been originated on accurate mathematical basis.

It is the duty of every loyal Indian citizen to take proper steps to keep this sacred Fine Art, Music, in tact and to pass on to the next generations in the same manner like our ancestors.

While Raga and Tala are the two main divisions of Indian Music consisting of its own lakshana of each the Tala, in its lakshana, consists of ten elements which are "Taladashapranas", Kala, Marga, Kriya, Anga, Graha, Jati, Kala, Laya, Yati and Prastara.

"सर्वेषामपि तालानां प्रस्तारो मातृका मता
तस्मादादौ प्रवक्ष्यामि प्रस्तारं तालवृद्धये"

As mentioned above by the Jaina Monk, Vaachanaacharya Sudhakalasa in his Sanskrit work namely

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"Sangeetopanishadsaaroddhaara" - 22nd Sloka - Chapter-II - written in 1350 A. D., among the ten elements the tenth element, Prastara, though many are not aware of it, is the only source of all the rhythmical forms of universe. In fact, all kinds of rhythmical fofms could be obtained only by this element and all these rhythmical forms are having serial numbers of origin and basing upon these serial numbers of origin only the authenticity of any rhythmical form could be identified.

For example in the Talas of Karnatak-music :

41 is the serial number of Adi-tala (422),
3 –do– Rupaka-tala (24),
21 –do– Triputa-tala (322),
193 –do– Jhampa-tala (712) and
3 –do– Trisra-Rupaka-tala (23)

and in the Talas of Hindusthani-music :

2057 is the serial number of Teental or Trital (484),
1 –do– Dadra (6),
67 –do– Jhaptal (253),
649 –do– Ektal (4422),
517 –do– Deepchandi (374),
529 –do– Damar (554),
547 –do– Ada-chautal (2444) and
1033 –do– Gaja-Jhampa (474).

But, while furnishing these serial numbers of Talas, there is every scope of furnishing incorrect serial numbers if the author does not take proper care by checking them thoroughly. So, to avoid the embarassment of furnishing any incorrect serial number for any Tala, many authors of books on music have very conveniently skipped off these serial numbers but furnished many Talas even without any serial numbers which lead to the different versions of Talangas for a single Tala.

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In the annals of our music literature Parshvadeva of 13 century was the first person to furnish serial numbers for nearly 50 Talas (furnished in the end of this book) in his book, "Sangeetasamayasara" out of which 10 numbers have been found incorrect. The second book is "Gayakalochanam (Telugu)" written and published in 1902 by Tacchoor Singaracharya Bros., in which around 160 Talas (furnished in the end of this book) have been furnished alongwith new names, serial numbers and Talangas out of which around 50 numbers have been found incorrect. This incorrectness of these above serial numbers has been found with the help of the easy-method "Uddishta" of this element, Prastara. In all other books no such serial numbers have been furnished and in the absence of these serial numbers there is no scope of determining the authenticity of any Tala cited in them.

In 1958, having come across several tables with figures in the Tala chapter of "Gayakalochanam", even without any definitions, and somehow guessing, by intuition, the latent treasure thereof I had a deep desire to bring out, what had been hitherto in dark, into light with indefatigable spirit. My pursuit since 1958 to find a person having profound knowledge in this subject, ended successfully in 1963 when I found an exponent on this chapter of Tala in Late Uppalapati Ankaiah who was my colleague. He expressed his deep anguish for not having cared and bestowed any interest to learn much more about this in his teens from his father who could taught him only different modes of permutation of Tala-prastara. He was very kind enough to teach me the various modes of permutation and affectionately showered his blessings upon me for my success in this Himalayan task of expounding all the hidden clues of this element. Later, though I have gone through many of the ancient and recent publications written in Sanskrit, Talugu, Tamil, Hindi and English wherein, unfortunately, no clues were revealed clearly, I was unable to understand even one-

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hundredth of the original matter ; but in my continued research. only by the grace of Almighty, the top clue of "NASHTA" flashed in my mind on 6-9-1969 and then after all the other clues followed suit.

I am very grateful to Late Prof. P. Sambamurthy who advised me to compile my research papers into the form of a book and also blessed me with an invaluable Fore-word to the Telugu version.

I am thankful to Sri Dwaram Bhavanarayana Rao, who had very carefully gone through this book with great interest and enthusiasm and gave his precious opinion to the Telugu version.

I shall ever be grateful to :

Late Uppalapati Ankaiah, my beloved Guru on this subject.

My beloved parents Late Akella Aswathanarayana Murthy and Smt. Kanakam who taught me this Sacred Fine Art, Music and encouraged me.

My wife, Chi. Sow, Akella Kameswari, for her inspired co-operation given althrough my extensive research work,

Sri Cherukupally Poornananda Sharma for the pains taken in giving a shape to this book both in Telugu and English versions,

Sri K. L. Narayana and Sri M S. N. Sarma for their co-operation in translating the Prastara portion of Sangeeta Ratnakara,

"Mahamahopadhyaya, Rashtrabhooshana" Dr. R. Sathyanarayana, the internationally reputed musicologist, who has incessantly been extending his very kind helping hand in so many ways like coining the title in English for this work as 'Permutative genius in Tala

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(prastara) in Indian Music', consenting to include his English translation of Nartananirnaya in this book, writing the 'Foreword' with his unfathomable depth of knowledge etc., etc., which I could never forget and

The authorities of the Telugu University, Andhra Pradesh, for having published this book with great enthusiasm.

In compliance to Late Prof. P. Sambamurthy's advice I could compile my research material on this topic in the form of a book during 1970 itself. But, since then, I have been adding on much more valuable material obtained in my research re-writing and re-tuning this book in 1974, 1982, 1984, 1985 (the year of publication of the Telugu version, Talaprastara-sagaram by A. P. Sangeeta Academy), 1987, 1988 and 1989.

Any lapses occurred in course of explaining this unfamiliar and intricate subject may kindly be adjudged with an open mind and intimated to me for correction in the next edition.

I happily welcome those persons who inform and enlighten new about now points relating to this element, Prastara, if any, for incorporating them in the future editions.

Warangal,
15th Nov, 1990

AKELLA MALLIKARJUNA SHARMA
AUTHOR

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PROLOGUE

In our ancient books on Music ten elements have been mentioned in the Tala-chapter and they are 1. Kala 2. Marga 3. Kriya 4. Anga 5. Graha 6. Jati 7. Kala 8. Laya 9. Yati and 10. Prastara. In this book, I intend to deal with the tenth element i.e., Prastara, giving, however, brief definitions of the remaining nine elements about which some differences of opinion are prevailing.

To define briefly, Prastara means the process of making different permutations and combinations of the Talangas on a systamatic basis, avoiding iteration. Categorising according to the number of Angas utilised in the process of the permutation, there are two kinds of modes of permutation mentioned in the ancient treatises. They are 1. Chaturanga-prastara in which only four Angas, namely Druta, Laghu, Guru and Pluta have been used in the process of permutation of the Angas pertaining to Chaturashra-jati only and 2. Panchanga-prastara wherein only five Angas, namely Anudruta, Druta, Laghu, Guru and Pluta have been used in the process of permutation of the Angas other than Chaturashra-jati. In those days Kakapada was forbidden from usage, it being an Anga to be rendered without producing any sound. But this omission does not seem reasonabie as the then authors themselves have mentioned in their books Talas like Simhanandana having 128-units which includes one Kakapada, Prithvikundai have 268-units including two Kakapadas, Indrakundali having 384-units including one Kakapada and also some other Talas along with Kakapada. As such, keeping the mathematical importance of Kakapada in view, this has been included in the processes of Chaturanga and Panchanga-prastaras and thus transformed Panchanga and Shadanga-prastaras respectively have only been prescribed in this book. Details have been

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worked out and given applying Panchanga-prastara to the Angas of only Chaturashra-jati and Shadanga-prastara to the Angas of all Jatis including Chaturashra-jati (in this connection, it may be noted that Shadanga-prastara, which has the least Anga of Anudruta consisting of only one-unit, could be made applicable to all the five Jatis since any number could be divided by figure '1', but the Panchanga-prastara, which has the least Anga, namely Druta consisting of two-units, could be made applicable only to the Chaturashra-jati but not to Trisra, Khanda, Mishra and Sankeerna-jatis, which have odd-numbers of 3, 5, 7 and 9 respectively, since these odd-numbers could not be divided by the even-number '2' without leaving any remainder). Apart from these two kinds of modes of permutation another mode of permutation called 'Samyuktanga-prastara' which is of recent past and so vast that in addirion to all the permutations derived in the process of Panchanga and Shadanga-prastaras, innumerable other permutations also derive in the process of this permutation, is also furnished. (Now, this is being called 'Shodashanga-prastara', but it is not correct. This name 'Shodashanga-prastara' is proper if this process of permutation is applied to the Angas pertaining to Chaturashra-jati only; and this name should have to be changed whenever the Jati is changed. The correct name of this mode of permutation is 'Samyuktanga-prastara' as interlaced Angas written one above the other are also used in this process of permutation).

The figures of all the different tables in this book have been worked out upto 12-units and furnished. If necessary, further figures may be obtained following the respective procedures.

To make this very rare and complicated topic easy to the readers a number of examples have, in detail, been furnished wherever necessary. The vital aspects, Nashta, Uddishta and Kalita, of this element, which are very interesting and useful at all times and

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which have never been elaborated clearly in any book, have, in detail, been furnished with the help of more than hundred different examples to make them easy to understand, digest, assimilate, remember and follow to the reader. One independent chapter itself, bringing out all the relevant clues of this element in a nut-shell, has also been furnished. For ready reference the Sanskrit versions of the relevant portions of Prastara pertaining to Sangeeta Ratnakara (97 Slokas starting from 312th to 408th of Taladhyaya) and Nartananirnaya (35 Slokas starting from 196th to 230th) have also been furnished in this book along with free English translation and the major reforms made accordingly by the author in different old texts.

In the annals of music literature, till now, only two books, Sangeetasamayasara (12th cen ury) and Gayakalochanam (1902), in which serial numbers, having natural link with the series of Angas, have been furnished, have been found out. Those Talas have also been furnished in this book along with the correct versions, wherever necessary.

UTILISATION :- This element of Prastara is highly useful for not only percussionists but also vocalists and instrumentalists. This helps the musicians to prove the authenticity of any rythmical form with the help of its serial number and in obtaining all the different mathematical combinations to use them in practical music. There are two kinds of prastaras :

1. Prastaras having scientific origin which can also be rendered. (all the Talas having the same value of unit for all the constituent Kriyas i. e., beats etc.,

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and devoid of Samyuktangas come under this category. Example : 35 Talas etc.)

2. Prastaras having scientific origin which cannot be rendered ; (all the prastaras consisting of Samyuktangas i. e., combinations of two or more Angas like Druta-Virama or Laghu-Druta or Pluta-Laghu -Druta-Virama or Kakapada-Dvi-Druta etc., written one above the other but having the constant value of unit for all the constituent Kriyas, come under this category. Example : Sharabhanandana Tala etc)

In Samyuktanga-prastara in the process of permutation of an Anga or figure of sixteen-units (Kakapada-Laghu-Virama of Trisra-Jati–3 ; Kakapada of Chaturashra-Jati–4 ; Pluta-Virama of Khanda-Jati–5 ; Guru-dvi-Druta of Divya-Sankeerna-Jati–6 ; Guru-Druta of Mishra-Jati-7 ; Guru of Mishra-Sankeerna-Jati-8 ; Laghu-tri-Druta-Virama of Sankeerna-Jati–9 ; Laghu-tri-Druta of Deshya-Sankeerna-Jati-10 ; Laghu-dvi-Druta of Mishra-Deshya-Sankeerna-Jati–12 ; Laghu of Deshya-Shuddha-Sankeerna-Jati–16 —— either of them pertaining to 16-units only) 32, 768 varieties of prastaras only derive and they include the prastaras 6595 of Chaturashra-Jati pertaining to Panchanga-prastara, 12975 of Trisra-Jati, 5294 of Chaturashra-Jati, 3221 of Khanda-Jati, 2412 of Divya-Sankeerna-Jati, 2031 of Mishra-Jati, 1834 of Mishra-sankeerna-Jati, 1727 of Sankeerna-Jati, 1668 of Deshya-sankeerna-Jati, 1617 of Mishra-deshya-sankeerna-Jati and 1598 of Deshya- shuddha-sankeerna-Jati pertaining to Shadanga-prastara. It will be interesting and colourful if some of those varieties of rhythmical forms are translated and sung in Swara-improvisation. Some examples of them have been furnished here.

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In each of the following combinations the series of units is furnished in the first line along with its serial number in the right extreme, the corresponding Mridanga-Jati in the second line which could be repeated thrice to utilise it as 'Muktayi or Tihai' and the corresponding notation in the last three lines which could be sung in Swara-improvisation.

APPLICATION OF THE COMBINATIONS :-

The notation of the following combinations is set to Sama-graha Pallavi of the Kriti "Sarojadalanetri — Shankarabharana-raga - Adi-tala – Shyamashastry" in which each one of them starts from the 5th Kriya in the medium tempo and starts from the 3rd Kriya in slow tempo.

In the series of units :

'1' denotes Anudruta,

'2' denotes Druta,

'3' denotes Laghu of Trisra-Jati or Druta-Virama of other remaining Jatis,

'4' denotes Laghu-Virama of Trisra-Jati or Laghu of Chaturashra-Jati or Dvi-Druta of other remaining Jatis and

'5' denotes Laghu-Druta of Trisra-Jati or Laghu-Virama of Chaturashra-Jati or Laghu of Khanda-Jati or Dvi-Druta-Virama of other remaining Jatis.

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In Mridanga-jati : 't' should be pronounced as 'tha' (त); 't' as 'ta' (ट); 'k' as 'ka' (क); 'k' as 'ki' (की); and 'd' as 'dhi' (धि).

In notation : 's' stands for 'sa' (स),

'r' stands for 'ri or re' (रि वा रे),

'g' stands for 'ga' (ग),

'm' stands for 'ma' (म),

'p' stands for 'pa' (प),

'd' stands for 'dha' (ध), and

'n' stands for 'ni' (नि),

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3 3 3 2 - 1 1 1 1 1 - 32037
t; d; t; d, t k t ṭ ṭ
ġ; ṙ; ṡ; n, ġ ṙ ṡ n d
ṙ; ṡ; n; d, ṙ ṡ n d p
ṡ; n; d; p, g m p d n

1 2 - 1 2 - 1 2 - 2 - 1 1 1 1 1 - 32110
t d, t d, t d, t, t k t ṭ ṭ
ġ ṙ, ṡ n, d p, d, ġ ṙ ṡ n d
ṙ ṡ, n d, p m, p, ṙ ṡ n d p
ṡ n, d p, m g, m, g m p d n

1 2 - 1 2 - 1 2 - 1 2 - 1 2 - 1 - 23406
t d, t d, t d, t d, t d, t
r s, g r, m g, p m, d p, m
g r, m g, p m, d p, n d, p
m g, p m, d p, n d, ṡ n, ṙ

1 1 1 - 1 1 1 - 1 1 1 - 1 1 - 1 1 1 1 1 - 32768
t ṭ ṭ t ṭ ṭ t ṭ ṭ t k t k t ṭ ṭ
ġ ṙ ṡ ṙ ṡ n ṡ n d n d ġ ṙ ṡ n d
ṙ ṡ n ṡ n d n d p d p ṙ ṡ n d p
ṡ n d n d p d p m p m g m p d n

1 1 3 - 1 1 1 3 - 1 1 1 1 1 - 31988
t k d; t ṭ ṭ d; t k t ṭ ṭ
ġ ṙ ṡ; ġ ṙ ṡ n; ġ ṙ ṡ n d
ṙ ṡ n; ṙ ṡ n d; ṙ ṡ n d p
ṡ n d; ṡ n d p; g m p d n

1 1 1 2 - 1 1 1 1 2 - 1 1 1 1 1 - 32248
t ṭ ṭ d, ṭ ṭ t k d, t k t ṭ ṭ
g m p m, r g m p m, s r g m p
m p d p, g m p d p, r g m p d
p d n d, m p d n d, g m p d n

1 1 1 1 1 2 - 1 1 1 1 2 - 1 1 1 - 30688
t k t ṭ ṭ d, ṭ ṭ t k d, t ṭ ṭ
r g m p d p, g m p d p, g m p
g m p d n d, m p d n d, m p d
m p d n ṡ n, p d n ṡ n, p d n

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In Mridanga-jati : 't' should be pronounced as 'tha' (त); 't̤' as 'ta' (ट); 'k' as 'ka' (क); 'k̤' as 'ki' (की); and 'd' as 'dhi' (धि).

In notation : 's' stands for 'sa' (स),

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'g' stands for 'ga' (ग),

'm' stands for 'ma' (म),

'p' stands for 'pa' (प),

'd' stands for 'dha' (ध), and

'n' stands for 'ni' (नि),

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1. 3 3 3 2 - 1 1 1 1 1 - 32037
   t; d; t; d, t k t ṭ ṭ
   ġ; ṙ; ṡ; n, ġ ṙ ṡ n d
   ṙ; ṡ; n; d, ṙ ṡ n d p
   ṡ; n; d; p, g m p d n

2. 1 2 - 1 2 - 1 2 - 2 - 1 1 1 1 1 - 32110
   t d, t d, t d, t, t k t ṭ ṭ
   ġ ṙ, ṡ n, d p, d, ġ ṙ ṡ n d
   ṙ ṡ, n d, p m, p, ṙ ṡ n d p
   ṡ n, d p, m g, m, g m p d n

3. 1 2 - 1 2 - 1 2 - 1 2 - 1 2 - 1 - 23406
   t d, t d, t d, t d, t d, t
   r s, g r, m g, p m, d p, m
   g r, m g, p m, d p, n d, p
   m g, p m, d p, n d, ṡ n, ṙ

4. 1 1 1 - 1 1 1 - 1 1 1 - 1 1 - 1 1 1 1 1 - 32768
   t ṭ ṭ t ṭ ṭ t ṭ ṭ t k t k t ṭ ṭ
   ġ ṙ ṡ ṙ ṡ n ṡ n d n d ġ ṙ ṡ n d
   ṙ ṡ n ṡ n d n d p d p ṙ ṡ n d p
   ṡ n d n d p d p m p m g m p d n

5. 1 1 3 - 1 1 1 3 - 1 1 1 1 1 - 31988
   t k d; t ṭ ṭ d; t k t ṭ ṭ
   ġ ṙ ṡ; ġ ṙ ṡ n; ġ ṙ ṡ n d
   ṙ ṡ n; ṙ ṡ n d; ṙ ṡ n d p
   ṡ n d; ṡ n d p; g m p d n

6. 1 1 1 2 - 1 1 1 1 2 - 1 1 1 1 1 - 32248
   t ṭ ṭ d, ṭ ṭ t k d, t k t ṭ ṭ
   g m p m, r g m p m, s r g m p
   m p d p, g m p d p, r g m p d
   p d n d, m p d n d, g m p d n

7. 1 1 1 1 1 2 - 1 1 1 1 2 - 1 1 1 - 30688
   t k t ṭ ṭ d, ṭ ṭ t k d, t ṭ ṭ
   r g m p d p, g m p d p, g m p
   g m p d n d, m p d n d, m p d
   m p d n ṡ n, p d n ṡ n, p d n

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8. 1 2 - 1 1 2 - 1 1 1 2 - 1 1 1 1 - 31710
t d, t k d, t ṭ d, k ṭ t k
p d, m p d, g m p d, r g m p
d n, p d n, m p d n, g m p d
n ṡ, d n ṡ, p d n ṡ, m p d n

9. 1 1 1 1 2 - 1 1 1 2 - 1 1 2 - 1 - 24048
k ṭ t k d, t k ṭ d, t k d, t
r g m p d, g m p d, m p d, p
g m p d n, m p d n, p d n, d
m p d n ṡ, p d n ṡ, d n ṡ, n

10. 1 1 5 - 1 1 5 - 1 1 - 25028
t k d ,,, t k d ,,, t k
r g m ,,, g m p ,,, p m
g m p ,,, m p d ,,, d p
m p d ,,, p d n ,,, d n

11. 1 1 1 4 - 1 1 1 4 - 1 1 - 25544
t k ṭ d,; t k ṭ d,; t k
s r g m,; r g m p,; m p
r g m p,; g m p d,; p d
g m p d,; m p d n,; d n

12. 2 1 1 2 - 2 1 1 2 2 1 1 - 27567
d, t k d, d, t k d, d, t k
s, r g m, r, g m p, g, m p
r, g m p, g, m p d, m, p d
g, m p d, m, p d n, p, d n

13. 1 1 1 1 2 - 1 1 1 1 2 - 1 1 1 1 -
k ṭ t k d, k ṭ t k d, k ṭ t k
p m g r g, d p m g m, r g m p
d p m g m, n d p m p, g m p d
n d p m p, ṡ n d p d, m p d n

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4. 1 1 2 - 1 1 1 1 2 - 1 1 1 1 1 1 - 32508
t k d, k̤ t̤ t k d, t k k̤ t̤ t k
g m p, g r g m p, m g r g m p
m p d, m g m p d, p m g m p d
p d n, p m p d n, d p m p d n

5. 1 1 1 1 1 1 2 - 1 1 1 1 2 - 1 1 - 28608
t k k̤ t̤ t k d, k̤ t̤ t k d, t k
g r s̤ r̤ g m p, s̤ r̤ g m p, m p
m g r g m p d, r g m p d, p d
p m g m p d n, g m p d n, d n

16. 3 2 - 3 2 - 3 2 - 1 - 21141
d; t, d; t, d; t, t
g; r, m; g, p; m, p
m; g, p; m, d; p, d
p; m, d; p, n; d, n

17. 2 3 - 2 3 - 2 3 - 1 - 19027
t, d; t, d; t, d; t
g, r; m, g; p, m; p
m, g; p, m; d, p; d
p, m; d, p; n, d; n

18. 2 1 2 - 2 1 2 - 2 1 2 - 1 - 23255
d, t d, d, t d, d, t d, t
s, g r, r, m g, g, p m, p
r, m g, g, p m, m, d p, d
g, p m̤, m, d p, p, n d, n

19. 1 2 2 - 1 2 2 - 1 2 2 - 1 - 22198
t d, t, t d, t, t d, t, t
s g, r, r m, g, g p, m, p
r m, g, g p, m, m d, p, d
g p, m, m d, p, p n, d, n

20. 1 1 3 - 1 1 3 - 1 1 3 - 1 - 20084
t k d; t k d; t k d; t
s g r; r m g; g p m; p
r m g; g p m; m d p; d
g p m; m d p; p n d; n

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21.	1	1	1	2	-	1	1	1	2	-	1	1	1	2	-	1	24312
	t	ḳ	ṭ	d,		t	ḳ	ṭ	d,		t	ḳ	ṭ	d,		t	
	s	g	r	r,		r	m	g	g,		g	p	m	m,		p	
	r	m	g	g,		g	p	m	m,		m	d	p	p,		d	
	g	p	m	m,		m	d	p	p,		p	n	d	d,		n	

22.	1	1	1	4	-	1	1	4	-	1	1	1	-	29128
	,	t	k	d,;		t	k	d,;		t	ḳ	ṭ		
	,	s	r	g,;		r	g	m,;		g	m	p		
	,	r	g	m,;		g	m	p,;		m	p	d		
	,	g	m	p,;		m	p	d,;		p	d	n		

23.	1	1	1	1	3	-	1	1	1	3	-	1	1	1	-	29648
	,	t	ḳ	ṭ	d;		t	ḳ	ṭ	d;		t	ḳ	ṭ		
	,	s	r	g	m;		r	g	m	p;		g	m	p		
	,	r	g	m	p;		g	m	p	d;		m	p	d		
	,	g	m	p	d;		m	p	d	n;		p	d	n		

24.	1	1	1	2	2	-	1	1	2	2	-	1	1	1	-	30168
	,	t	k	d,	d,		t	k	d,	d,		t	ḳ	ṭ		
	,	s	r	g,	m,		r	g	m,	p,		g	m	p		
	,	r	g	m,	p,		g	m	p,	d,		m	p	d		
	,	g	m	p,	d,		m	p	d,	n,		p	d	n		

25.	1	1	1	1	1	1	-	1	1	1	1	1	-	1	1	1	1	1	-	3276
	,	t	k	t	ḳ	ṭ		t	k	t	ḳ	ṭ		t	k	t	ḳ	ṭ		
	,	s	r	g	m	p		r	g	m	p	d		g	m	p	d	n		
	,	r	g	m	p	d		g	m	p	d	n		m	p	d	n	ṡ		
	,	g	m	p	d	n		m	p	d	n	ṡ		p	d	n	ṡ	ṙ		

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IMPORTANT TECHNICAL – TERMS, ABBREVIATIONS & SIGNS USED IN THIS BOOK

1. 'A' – 'U' – Anudruta – or '(' – AP - Anudruta-permutation
   AEP - Anudruta-ending-permutation
   ADP - Anudruta-devoid-permutation
   ACP - Anudruta - consistent-permutation
   AAEP - All-anudruta - ending-permutation

2. 'D' – 'O' – Druta – DP - Druta-permutation
   DEP - Druta- ending-permutation
   DDP - Druta-devoid - permutation
   DCP - Druta-consistent- permutation
   ADEP - All-druta -ending-permutation

3. 'L' – 'I' – Laghu - LP - Laghu-permutation
   LEP - Laghu-ending - permutation
   LDP - Laghu-devoid - permutation
   LCP - Laghu-consistent - permutation
   ALEP - All-laghu-ending - permutation

4. 'G' – 'S' – Guru – GP - Guru-permutation
   GEP - Guru-ending - permutation
   GDP - Guru-devoid - permutation
   GCP - Guru-consistent- permutation

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AGEP - All-guru-ending- permutation

5. 'P' – 'S' – Pluta - PP - Pluta - Permutation
PEP - Pluta - ending- permutation
PDP - Pluta-devoid - permutation
PCP - Pluta-consistent-permutation
APEP - All-pluta - ending- permutation

6. 'K' – '+'–Kakapada - KP - Kakapada-permutation
KEP - Kakapada - ending - permutation
KDP - Kakapada-deviod-permutation
KCP - Kakapada-consistent-per mutation
AKEP - All - kakapada - ending-permutation

7. UP - Unit-permutation
UEP - Unit-ending-permutation
UDP - Unit-devoid-permutation
UCP - Unit- consistent - permutation
AUEP - All-unit-ending- permutation

8. IAEP - Identical - Anga - ending-permntation

9. 'S' :- Sankhya :- The total number of prastaras obtained in the process of permutation.

10. 'M' :- Mahapatala :- The total number of Angas or figures used in the process of permutation.

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11. Prastara - Process of permutation.
12. Chaturanga-prastara - Quadrivalent-permutation
13. Panchanga-prastara - Pentavalent-permutation
14. Shadanga - prastara - Hexavalent or Sexivalent - permutation

15. Samyuktanga-prastara - Synaptic-permutation
16. Akhanda-prastara - General-permutation
17. Khanda-prastara - Divisional-permutation
18. Heena-prastara -Devoid-permutation
19. Yukta-prastara - Consistent-permutation
20. Anuloma-prastara - Obverse-permutation
21. Viloma-prastara - Reverse-permutation

22. GENERAL-KEY-RULE :– While writing 'Sankhya' of all the tables of general permutation and for the lowest-lines of all the tables of Angas or figures 'figure '1' should invariably be written to the left of the extreme left house.

23. PROXIES :– In this element of Prastara several tables consisting of figures are to be written which furnish the details of various innumerable prastaras obtained in the process of permutation. But, to avoid the laborious process of permutation, certain easy methods are explained to write these figures basing upon the figures of particularly specified preceding houses (but not of succeeding houses at all), which classify and represent the Anudruta-ending-permutations (AEPs), Druta-ending-permutations (DEPs), Laghu-ending-permutations (LEPs), and so on, thus classifying the prastaras basing upon the Talangas or figures remaining in the extreme right of each prastara. The numbers of these specified preceding houses, which here-in-after are called 'PROXIES', play an indispensable role in this element.

In Panchanga-prastara wherein only five Talangas ie., Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation, there are only five

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'Proxies' viz., 1, 2, 4, 6 & 8 representing the respective Anga-ending-permutations of the above five Angas respectively and in Shadanga-prastara wherein all the six Angas i.e., Anudruta, Druta, Laghu, Guru, Pluta & Kakapada are used in the process of permutation the six 'Proxies' representing the respective Anga-ending-permutations of these above six Angas are :-

1 – 2 – 3 – 6 – 9 – 12 – for Trisra-jati,
1 – 2 – 4 – 8 – 12 – 16 – for Chaturashra-jati,
1 – 2 – 5 – 10 – 15 – 20 – for Khanda-jati,
1 – 2 – 7 – 14 – 21 – 28 – for Mishra-jati and
1 – 2 – 9 – 18 – 27 – 36 – for Sankeerna-jati and

in Samyuktanga-prastara, where in addition to these above six Angas. the other synaptic Angas are also used, all the preceding consecutive houses are 'Proxies'. It should be remembered that in Panchanga-prastara, except the first proxy '1', all the remaining proxies are multiples of '2', in Shadanga-prastara, except the first and second proxies, '1 & 2', all the remaining proxies are the multiples of '3' in Trisra-jati, '4' in Chaturashra -jati, '5' in Khanda-jati, '7' in Mishra -jati and '9' in Sankeerna-jati and in Samyuktanga-prastara, fully (0), all the numbers serially and consecutively are the 'Proxies' and always the specific mention of these above figures, '2, 3, 4, 5, 7, 9&0' indicates the relation of the concerned respectively. If needed the relevant details of all other Visesha-jatis, Divya-sankeerna-jati (6), Mishra-sankeerna-Jati (8), Deshya-sankeerna-Jati (10), Mishra-deshya-sankeerna-Jati (12) and Deshya-shuddha-sankeerna- jati (16) could also be obtained basing upon the multiples of ther respective proxies in the same manner.

24. INDICATIVE FIGURES OF THE EXAMPLES :– In this book while furnishing the examples of various problems of Nashta, Uddishta and Kalita, several questions relating to different permutations have been pres-

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cribed along with their respective methods of answering them to make all these problems easy to understand. Application of these figures pertaining to those permutations have been given here under :

Akhanda-Prastara (Nos. of the figures)	Khanda-Prastara	Particulars
1	1	Indicative number of the mode of permutation (i.e., 2, 3, 4, 5, 7, 9 &0)
2	2	Unit-value of the permutation in figures.
–	3	Proxy-number of the table concerned which represents the respective Anga.
–	4	Devoid or Consistent numbers of the respective Angas or figures.
3	5	Sankhya
4	6	Serial numbers of the prastara for Nashta of Kalita OR Series of the Angas or figures of the prastara for Uddishta

Example:– Akhanda-Prastara :– 2–12–632–1---
Among them the first figure '2' represents Panchanga-prastara, the second figure '12' represents 12-Druta-permutation, the third figure '632' represents the respective Sankhya and the last figure '1' represents the 1st prastara,

Khanda Prastara :– 2–12–1–0–29–12———
Among them, the first figure '2', as above, indicates the Panchanga - prastara, the second figure '12', as above, indicates the 12–Druta–permutation, the third figure '1' indicates the first–proxy of Druta, the fourth figure '0' indicates the Druta-

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devoid - permutation, the fifth figure '29' indicates the Sankhya of the Druta-devoid - permutations of 12–DP and the sixth figure '12' indicates the 12th prastara.

25. 'MN' :– The exact middle number of the prastaras for the odd-number of Sankhya and the Anuloma serial - number of the prastaras of the last prastara of the first - half for the even - number of Sankhya is called the prastara of the 'Midmost-number or mid - number (MN)' and accordingly :

(i) OMNU - indicates the 'Odd-mid-number's - upper-prastara,'

(ii) EMNU - indicates 'Even-mid - number's - upper - prastara',

(iii) OMNL - indicates 'Odd-mid-number's - lower - prostara',

(iv) EMNL indicates 'Even - mid - number's - lower - prastara',
All these above are used in 'Madhyarupa - nashtoddishta',

26. 'SF' :– In Panchanga, Shadanga and Samyuktanga-prastaras Druta, Anudruta and figure '1' are the inferior (least) ones respectively and all the remaining are superior ones. In a series of Angas or figures of a prastara the inferior Angas or figures are originated by the un-deducted figures of Sankhya and the superior Angas or figures are originated by the successfully deducted figures of Sankhya. The total of the figures of Sankhya which have successfully been subtracted and originated superior Angas or figures is called 'Superiors' - figure', and this is used in Uddishta.

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27. 'F.N' :– Fractional - number :– In a fraction like 2/3 the lower figure '3' cannot be divided by the upper figure '2' without any remainder and in a fraction like 2/6 the lower figure '6' can be divided by the upper figure '2' without any remainder. In respect of the 'Interval-units' the former has been named as 'Fractional-number' (see Chapter - 5)

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iii	26	of	if
viii	25	transquility	tranquility
viii	29	फलदास्स दानयज्ञर्वे	फलदास्सर्वे दानयज्ञ
x	34	Sudhakalasa	Sudhakalasha
xii	37	Talugu	Telugu
xiv	22	new	me
xiv	22	now	new
xv	12	systamatic	systematic
xv	26	reasonabie	reasonable
xv	29	Kundai	Kundali
xv	29	have	having
xvi	18	rion	tion
xvi	18	process	processes
xvii	25	rythmical	rhythmical
xxxvi	15	prastara of	prastara) of
xxxvi	17	prastara of	prastara) of
xxxvi	26	hand-	hand-writing
xxxvi	27	writing incorrect	Incorrect
4	21	described	describes
5	8	tendered	rendered
7	12	Shama	Sama
8	9	yermutation	permutation
8	10	Meha	Maha
14	12	order from	order of value from
16	21	figured	figures
16	29	be	————————
17	17	Chaturshra	Chaturashra
19	16	furnishes	furnish
22	6	0 1 0	1 0 0
26	8	coloumn	column
28	3	consitent	consistent
34	15	expept	except
35	6	5	4
35	13	tolal	total
37	34	combinotions	combinations
42	8	4rh	4th

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45	4	Inrerval	Interval
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51	32	permutatation	permutation
55	21	Uparishita	Uparisthita
59	4	permutatlon	permutation
60	5	86	85
61	15	consecutlvejy	consecutively
61	27	than	bigger than
62	27	tabie	table
63	32	ruie	rule
64	13	obitained	obtained
68	12	the the	the
69	27	aeswer	answer
70	6	sheuld	should
70	6	lern	rule
70	28	pertain:ng	pertaining
71	19	pet	per
72	3	of	————
75	18	un-ducted	undeducted
85	3	S	S
88	6	subtracten	subtracted
101	29	No.	No. 1
104	25	per-	permu-
109	14	erqui-	requi-
116	2	Kaiita	Kalita
119	12	occuring	occurring
123	15	PEP	GEP
123	17	(2+3=)	(2+3=5)
123	20	'2'	'12'
125	19	3(	(3
125	28	3G	(3G
128	4	CHAPTER-IV	CHAPTER-5
128	8	precribed	prescribed
129	16	prastara	prastaras
130	22	and Sankhya	Sankhya
132	26	of	of two Angas. For the lines pertaining to the combinations of

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132	28	repesents	represents
136	28	comibinations	combinations
138	2	Angas	two Angas
139	28	fhe	the
140	6	remaindar	remainder
158	30	sutractable	subtractable
159	18	Uddista	Uddishta
159	32	he	be
160	16	Sarngadeva	Sharngadeva
161	8	en	ed
165	12	Write	Write the
165	26	Viama	Virama
166	1	yapati)	yapti)
166	1	id	in
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166	27	precedent	and further precedent
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179	5	furnlshed	furnished
179	33	tney	they
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180	34	rhe	the
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183	22	fo	to

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Chapter - 1

Ten Elements of Tala

In South Indian Music the chapters of Raga and Tala are very complex and elaborate. Between them, the system of Tala is more difficult and complicated. It is unparalleled in any system of music in the world. The various time measures used by all the nations of the world put together form only a small fraction of the innumerable varieties of rhythm used in South Indian Music.

The Tala has been divided into the following ten elements: 1. Kala 2. Marga 3. Kriya 4. Anga 5. Graha 6. Jati 7. Kala 8. Laya 9. Yati 10. Prastara.

1.1. KALA (काल)

This element is defined as the mode of measuring the duration of Kriya i.e., any act used to demonstrate or manifest the time quantity. It connotes the (uniform) speed with which the musical (or Dance) event is executed over each division of the tala cycle. Such speed i.e., the rate at which elements of a musical (or dance) event occur per unit time, is said to be first, second, third etc., depending on whether the event is executed at the initial, doubled or quadrupled rate i.e., whether the same event is executed in a given duration

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or in half or quarter of the original duration. Thus Kala (musical speed) changes by progressive doubling.

The unit time for reckoning Kala is Matra. In order to accommodate elastic use and subjective variation, the Matra is given in Shastra a flexible definition.

1. It is equated to 'Nimeshakala' i.e., the time required to close and open the eyes naturally,

"Nimeshakalo Matrah" - Kalanidhi (commentary of Kallinatha) on Sarngadeva's Sangeetaratnakara, 5. 16. (Gods are called 'Animishas' because they do not blink; others are 'Nimishas' because their eyes open and close)

This is taken roughly equal to a second and so Matra roughly corresponds to the objective duration of a second.

2. The Matra is taken as the total duration of uttering the five short syllables 'Ka, Cha, Ta, Tha and Pa'.

"Pancha-Laghu- aksharocchara - mita matra" - Sarngadeva's Sangeeta Ratnakara, 5. 16.

This value is adopted in Marga Talas. Since Laghu (short) syllables were involved, the span was called Laghu. This also is approximately of the duration of a second.

3. In Desi Talas, however, the Laghu had a variable value; its Matra could be of 4, 5 or 6 units. This was finally standardised to a duration of a 4 units and is so used. This Laghu is hence called Chaturashra while the one of three units is called Trisra.

1.2. MARGA (मार्ग)

Marga means extent or measure. It measures the magnitude of the organs of Tala such as Druta, Laghu . etc. Its measuring divice is Matra or Kala. It is not

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merely the total quantity of time but must include Kriya i.e., the act of performing Tala also. In other words Kala, which is of the form of a group of Kriyas is Marga. The word Marga is appropriate to this vital element because it indicates the root taken in time to arrive at the destination by manipulation of other elements.

Achyutaraya prescribed 8, 4, 2 & 1 Matra-durations respectively for the Margas, Dakshina, Vartika, Chitra and Chitratara. He further described the durations of Druta and Anudruta respectively for Chitra-tama and Ati-Chitra-tama Margas.

1.3. KRIYA (क्रिय)

Kriya is the manual act used to demonstrate or manifest the quantity of each organ, the structure and the quantity of the Cycle (Avarta) of a Tala which are borne in the mind for their physical manifestation. Kriyas are separately described for Marga and Desi Talas. These are divided into sounded (Sashabda) and silent (Nisshabda) Kriyas. Beat, finger snapping, clapping are examples of the former while counting, waving of the hand are examples of the latter.

I. Marga-Kriyas :-

(a) Nisshabda-Kriyas :-

1. Avapa :- Counting of the time duration by folding the fingers of the hand facing upwards.
2. Nishkrama :- Counting of the time duration by unfolding the fingers of the hand facing down–wards.
3. Vikshepa :– Moving the hand towards right.
4. Pravesha :– Bringing it back.

(b) Sashabda–kriyas :–

1. Dhruva :– Producing sound with the thumb and middle–finger.
2. Shamya :– Striking on the right–hand palm with the left–hand palm.

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3. Tala :– Striking on the left–hand palm with the right–hand palm.
4. Sannipata :– Clapping with both the hands facing each other.

II. Deshya – Kriyas :-

(a) Nisshabda - Kriyas :-

1. Sarpini :- Moving the hand towards left like a flag with the palm facing downwards.
2. Krishna :- Moving it towards right.
3. Padmini :- Bringing it downwards towards front side.
4. Visarjita :- Waving it outwards turning the palm upwards.
5. Vikshipta :- Bringing it towards self closing in the fingers.
6. Pataka :- Raising the hand upwards like a flag.
7. Patita :- Bringing it down like a flag.

(b) Sashabda - Kriya :-

1. Dhruvaka :- A beat of the hand.

1.4. ANGA (अंग)

Anga means organ. This element described the structure of the Tala in terms of the various divisions each of which is marked by an account of beat. The Anga of Tala also means the number and order of its structural units. These are Anudruta consisting of single–unit duration, Druta having doble-unit duration; and while Laghu carries varying duration basing upon the unit-values of Jati, other remaining Guru, Pluta and Kakapada carry 2, 3 & 4 times of the duration of Laghu respectively.

1. Anudruta :- "U" is the sign of Anudruta. This should be rendered with the help of Deshya-Kriya,

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Dhruvaka and its synonyms are Ardhachandra, Vyanjana Anunasika, Avyakta and Virama.

2. Druta :- "O" is the sign of Druta. This should be rendered with the help of Dhruvaka and Visarjita of Deshya-Kriyas and its synonyms are Ardhamatra, Vyoma, Bindu, Valaya, Vritta and Kham.

3. Laghu :- "I" is the sign of Laghu. This should be tendered with the help of Dhruvaka followed by counting fingers for maintaining the different units of time of any Jati and its synonyms are Matra, Sarala, Hrasva, Kala and Shara.

4. Guru :- "S" is the sign of Guru. This should be rendered with the help of Dhruvaka and Patita each followed by counting fingers for maintalning the units of time of Jati and its synonyms are Dvimatra, Vakra, Kaana. Yamala and Deergha.

5. Pluta :- "$\overset{1}{S}$" is the sign of Pluta. This should be rendered with the help of Dhruvaka, Sarpini and Krishna each followed by counting fingers for maintaining the units of time of Jati and its synonyms are Samodbhava, Deepta, Tryanga and Trimatra.

6. Kakapada :- "+" is the sign for Kakapada, This should be rendered with the help of Sarpini, Krishna, Pataka and Patita, it being an absolute Nisshabda - Anga, each followed by counting fingers for maintaining the units of time of Jati and its synonyms are Hamsapada, Nisshabda, Chaturlaghu and Chaturmatra.

1.5. GRAHA (ग्रह)

Graha is the position of attack i. e., mutual relation between the commencement of the Tala cycle and the commencement of the melody line. This is of two kinds. It is said to be Sama if both positions of commencement coincide i. e., if the melody line commences at the commencement of the Tala cycle itself. It is said to be Vishama otherwise. This is again of

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two kinds. It is Anagata if the melody line commences after the Tala cycle has commenced. It is Ateeta if the melody line commences first.

1.6. Jati (जाति)

Jati defines the quantity of the Tala cycle by defining the quantity of Laghu. There are five Laghu-jatis. They are : Trisra, Chaturashra, Khanda, Mishra and Sankeerna and have the time quantities of 3, 4, 5, 7 & 9 units respectively. Rarely other Laghu – jatis such as Divya-Sankeerna, Mishra - Sankeerna, Deshya-Sankeerna, Mishra - Deshya - Sankeerna and Deshya-Shuddha-Sankeerna consisting of 6, 8, 10, 12 & 16 units respectively are also used. Synonyms of all these ten Jatis are Svarga – laghu (3), Manushya– Laghu (4), Deshya–laghu, (5), Hamsa-laghu (7), Chitra-laghu (9) Divya Laghu (6), Simha – laghu (8), Varna – laghu (10), Vadya – laghu (12) and Karnataka–laghu (16) respectively. The different units of Laghu – jatis should be maintained by counting fingers of the same hand followed by the starting Kriya.

1.7. KALA (कल)

Kala defines the quantity of time possesses by the entire cycle or Avarta of a Tala. While the original quantity of such time was called "Yathakshara" or "Eka – kala", twice of its quantity was called "Dvi–kala" and twice of the quantity of "Dvi–kala" was called "Chatushkala". Dvi – kala and Chatushkala were made use in Marga – talas in terms of Gurus only.

1.8. LAYA (लय)

Laya may be roughly translated as tempo which describes the speed of the melody line. It is of 3 kinds : Druta, Madhya and Vilambita i. e., fast, medium and slow respectively. Sometimes these tempi themselves are further sub – divided into the following 9 varieties, the names of which are self – descriptive :

Vilambita-Vilambita, Madhya-Vilambita, Druta-Vilambita

– do – Madhya	– do – Madhya	– do – Madhya
– do – Druta	– do – Druta	– do – Druta

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1.9. YATI (यति)

Yati is roughly translated into English as 'Caesura' It consists of forming different patterns in melodic or word flow by arranging the pauses in various ways. This was done in two methods: (i) manipulating the slow, middle and fast tempi in such a way as to arrive at the desired pattern and (ii) arranging the Tala organs of different sizes (heavy, light etc.) in such a way as to obtain the required pattern. They are different approaches to the same aspect.

Early treatises describe three Yatis: Sama, Shrotovaha and Gopuccha. In Shama–yati the density of flow is uniform in word or melody. In Srotovaha–yati it commences small but gradually enlarges like a river. Gopuccha (lit. cow's tail) is the opposite i.e., flow begins large but tapers off at the end. Later treatises add three more: Mridanga–yati having heavy Angas at the middle and lighter Angas at the ends. This is also called 'Yavamadhya'. The opposite of this is called 'Pipeelika or Vedamadhya'. If two tempi frequently recur in a repeating Tala–cycle, it is said to be Kharjurika–yati. In Vishama–yati there is no discernible pattern in the arrangement of tempi or organs.

1.10. PRASTARA (प्रस्तार)

Rhythmical forms are innumerable and they all are the derivatives of this element, Prastara, in which Talangas are permuted into all possible combinations in a systematic process to avoid repetition.

Taking the number of different Talangas used in the process of permutation into account the modes of permutation are divided into four kinds and they are: 1. Chaturanga – Prastara 2. Panchanga – Prastara 3. Shadanga–Prastara and 4. Samyuktanga–Prastara. Each one of these modes of permutation has two main divisions namely 1. Akhanda–Prastara and 2. Khanda–Prastara among which Khanda – Prastara has two sub–

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divisions namely 1. Heena – Prastara and 2. Yukta–Prastara. All these divisions consist of two different processes of prastara namely 1. Anuloma–prastara and 2. Viloma–prastara and two key–figures namely 1. Sankhya and 2. Mahapatala, which are the total number of prastaras and the total number of Talangas used in the process of permutation respectively.

Even without adopting the laborious process of yermutation there are very interesting easy methods to obtain the above two key-figures of Sankhya and Mehapatala and also to obtain the 'series of Talangas of a particular serial number of prastara in question', the 'serial number of a prastara in question consisting of a particular series of Talangas' and the 'total number of all the different Talangas used upto a particular serial number of prastara in question' which are named as 'Nashta, Uddishta and Kalita' respectively.

This element helps in obtaining the full details of all the various prastaras many of which are highly useful also in Swara - improvisation.

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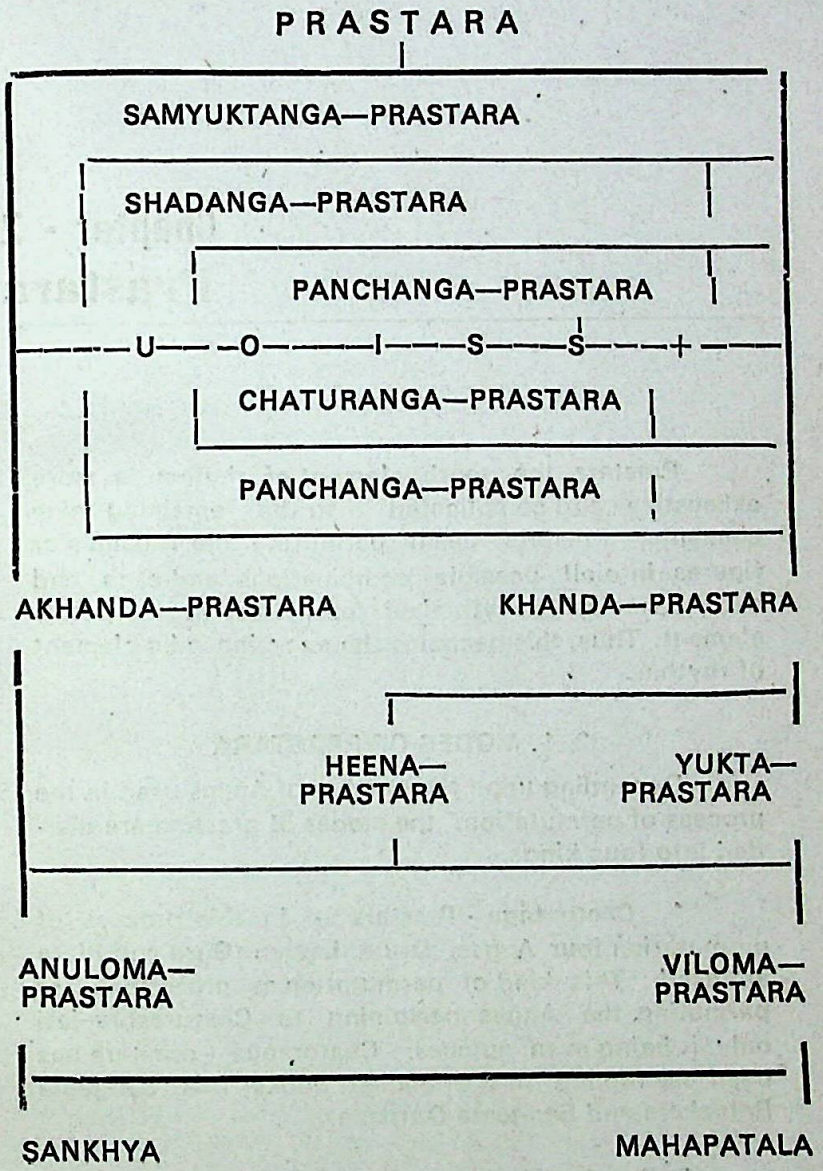

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Chapter - 2
Prastara

Prastara, the tenth element of rhythm, is more exhaustive and complicated than the remaining nine elements. Prastara means permuting the Talangas or figures into all possible combinations and each and every conceivable rhythmical form is derived from this element. Thus, this becomes the encyclopaedic element of rhythm.

2. 1. MODES OF PRASTARA

Depending upon the number of Angas used in the process of permutation, the modes of prastara are divided into four kinds.

1. Chaturanga - Prastara :– In this process of permutation four Angas, Druta, Laghu, Guru and Pluta are used. This kind of permutation is prescribed for permuting the Angas pertaining to Chaturashra–jati only, it being even number. Chaturanga – prastara has been mentioned in the ancient books like Sangeeta Ratnakara and Sangeeta Darpana.

2. Panchanga – Prastara :– (a) In this process of permutation five Angas namely, Anudruta, Druta, Laghu, Guru and Pluta are used. This kind of permutation is prescribed for permuting the Angas pertain-

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ing to all the Jatis consisting of odd numbers i. e., Trisra, Khanda, Mishra and Sankeerna. In addition to the above mentioned Chaturanga – prastara, this Pan– changa – prastara has also been mentioned in books like Taladashapranapradeepika.

NOTE :– The above two modes of Chaturanga and Panchanga – prastaras are devoid of Kakapada (sound – less Anga) and the below mentioned three modes of Panchanga-prastara (b), Shadanga – prastara and Samyuktanga – prastara are consistent of Kakapada. The figurss of all the tables of this book are calculated for these three modes of permutation given below and if the figures of the above two modes are also desired the figures pertaining to Kakapada of them should be excluded.

(b) In this process of permutation five Angas namely Druta, Laghu, Guru, Pluta and Kakapada are to be used and this kind of permutation is prescribed for permuting the Angas pertaining to Chaturashra – jati only. This is only an addition of Kakapada to the above mentioned Chaturanga – prastara.

3. Shadanga – prastara :– In this process of per– mutation all the six Angas namely Anudruta, Druta, Laghu, Guru, Pluta and Kakapada are to be used. This process could be applied for permuting the Angas of all the Jatis consisting even and odd numbers alike. This too is an addition of Kakapada to the above mentioned Panchanga – prastara (a) having been extended to Chaturashra – jati also.

4. Samyuktanga – prastara :– In this process of permutation, in addition to the usual six Angas i. e., Anudruta, Druta, Laghu, Guru, Pluta and Kakapada, various other combinations of two or more of these six Angas, formed by interlacing and writing one above the other, are also used. The synonyms of this mode of permutation are 'Mishramanga – prastara and Mishritanga – prastara'.

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2. 2. DIVISIONS OF PRASTARA

This element, Prastara has two main divisions and they are : 1. Akhanda-prastara (synonyms : Nija-prastara and Sarva–prastara) in which Angas or figures should be permuted following some stipulated rules and regulations and 2. Khanda-Prastara in which Angas or figures should be permuted following the same rules as in Akhanda-Prastara but observing some rest–rictions like devoid of a particular Anga or figure or consistent of a particular number of a particular Anga or figure. Among them Khanda–prastara has two sub-divisions and they are : 1. Heena–prastara in which permutation should be made devoid of a particular Anga or figure and 2. Yukta–prastara in which per–mutation should be made consistent of a particular number of a particular Anga or figure.The process of permutation of all the above divisions is of two kinds and they are 1. Anuloma-prastara in which the process of permutation should be made in obverse order and 2. Viloma-prastara in which the process of permutation should be made in reverse order.

Under all the above divisions various and innu-merable prastaras derive upon mathematical basis and to precisely know the details of all those prastaras two key-figures namely Sankhya and Mahapatala are prescribed which represent the total number of the prastaras and the total number of all the different Angas or figures used in the process of permutation respectively.

There are very interesting easy methods to obtain the above two key-figures of Sankhya and Mahapatala even without adopting the laborious process of permu-tation. Also there are three more very important and useful easy methods named as Nashta, Uddishta and Kalita by which answers for 'the series of Angas or figures of a particular number of prastara in question', 'the serial number of a prastara consisting of a parti-

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cular series of Angas or figures in question' and 'the total number of all the different Angas or figures used in the process of permutation upto a particular number of prastara in question' could respectively be obtained very easily even without adopting the laborious process of permutation.

Among them while Nashta and Uddishta could be answered with the help of Sankhya, Kalita could be answered with the help of both Sankhya and Maha-patala.

2. 3. RULES FOR THE PROCESS OF PRASTARA

In order to easily understand and follow the process of permutation let us recollect the unit's column, tenth's column etc., as is taught in general mathematics. These columns are counted and read from the right towards left. For Example, in the number 987654321, the figure :

'1' is in the units' column,
'2' is in the tenths' column,
'3' is in the hundreds' column,
'4' is in the thousands' column,
'5' is in the ten-thousands' column,
'6' is in the lakhs' column,
'7' is in the ten-lakhs' column,
'8' is in the crores' column
'9' is in the ten-crores' column,

Note :- For the purpose of permutation the Angas or figures should always be cited and written only from right towards the left observing the above columns.

Some rules and regulations are to be followed to write all the possible permutations and combinations serially to avoid iteration and they are prescribed hereunder :

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2.3.1 AKHANDA - PRASTARA (GENERAL-PERMUTATION) :-

2.3.1.1. Anuloma-prastara (obverse-permutation) :-

1. The value of any prastara should be cited in number of the least (inferior) Angas only occurring in a particular mode of permutation and for an equal value of such prastara, minimum possible number of Angas or figures only should be written in the 1st prastara, carefully observing the relevant rules and restrictions, if any. If two or more Angas or figures are to be written in the 1st prastara they should be written anti–clockwise only in descending order from right to left of the 1st prastara.

2. If there is more than one Anga or figure in the prastara, the permutable Anga or figure at the extreme left should at first be permuted.

3. If the Angas or figures in the extreme left are so minute that they could not further be permuted, the immediate next permutable Anga or figure to their right only should be permuted.

4. To permute an Anga or figure write down the immediate lower Anga or figure in value than of the upper Anga or figure in the same column.

5. After writing down the lower Anga or figure than of the upper Anga or figure, for the remainder, a suitable independent Anga or figure should be written to the left of the Anga or figure already written For this remainder, if two or more Angas or figures are to be written they should be written anti-clockwise only in descending order of value to the left of the Anga or figure already written.

6. If there are Angas or figures to the left of the upper Anga or figure, the remainder-value of the permuted Anga or figure should be added to the total

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value of all the left–side Angas or figures and a suitable Anga or figure should be written to the left of the Anga or figure already written, and if two or more Angas or figures are to be written for this total value they should be written anti-clockwise, to the left of the Anga or figure already written in descending order of value.

7. The Angas or figures, if any, which are to the right of the Anga or figure being permuted, should be brought down and written as they are in the same columns.

8. Carefully observing the relevant rules and restrictions, if any, the process of permutation should be continued until all the Angas or figures become so minute that none of them could further be permuted.

2. 3. 1. 2. Viloma – prastara (reverse – permutation) :–

NOTE :– In Viloma - prastara the process of permutation of Angas or figures should be made just in the reverse order of Anuloma - prastara mentioned above and this could easily be understood by writing the Anuloma - prastaras in reverse order successively one below the other from the last one to the first one in the same columns.

1. In the 1st prastara all the Angas or figures of inferior value should only be written equal to the total value of the prastara and in this process if different Angas or figures are to be written they should always be written anti - clockwise i. e . , from right to left, in ascending order of value carefully observing the restrictions, if any.

2. From left to right the Angas or figures should successively be permuted in reverse order into possible superior Angas or figures,

3. To permute an Anga or figure in reverse order, immediate superior Anga or figure should always be

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written below the inferior Anga or figure i . e . , Druta below Anudruta, Laghu below Druta, figure '2' below '1', figure '3' below '2' and so on.

4. The superior Anga or figure should always be written below the inferior Anga or figure, only if the value of the superior Anga or figure is not less than the total value of the above inferior Anga or figure including its preceding Angas or figures.

5. After writing the superior Anga or figure below the inferior Anga or figure, if the total value of the above inferior Anga or figure, including its preceding Angas or figures exceeds the value of the superior Anga or figure, one or more least (inferior) Angas or figures should be written for the difference of value and if two or more Angas or figures are to be written for the difference of value, they should be written anti - clockwise in ascending order of value, to the left of the superior Anga or figure, carefully observing the restrictions, if any,

6. All the Angas or figures which are to the right-side of the inferior Anga or figured being permuted in reverse order should always be brought down and written as they are in their respective columns.

7. This process of permutation in reverse order should always be continued until all the Angas or figures of the prastara become possible superior ones.

8. Among all the prastaras the total value of all the Angas or figures of each prastara should always be be one and the same.

2. 3. 2. KHANDA – PRASTARA (Divisional - permutation) :-

The process of Khanda – prastara should also be made following the same rules of Akhanda - prastara mentioned above but observing some restrictions like devoid or consistent of a particular Anga or figure. This is of two kinds and they are namely 1. Heena –

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prastara (Devoid—permutation) in which the process of permutation should be made devoid of a particular Anga or figure and 2. Yukta—prastara (Consistent—permutation) in which the process of permutation should be made consistent of a particular number of a particular Anga or figure as furnished in the examples.

2.4. TABLES OF ANGAS OR FIGURES AND THEIR APPLICATION

The details of the two key—figures, Sankhya and Mahapatala of all modes of permutation have been furnished in this book in different tables. Among them the tables from :

(a) 1st to 7th belong to Panchanga—prastara (Chaturashra—jati,)

(b) 8th to 15th belong to Shadanga—prastara (Trisra—jati)

(c) 16th to 22nd belong to do (Chaturshra—jati)

(d) 23rd to 28th belong to do (Khanda—jati)

(e) 29th to 33rd belong to do (Mishra—jati)

(f) 34th to 38th belong to do (Sankeerna—jati)

(g) 39th to 52nd belong to Samyuktanga—prastara (all Jatis).

In each page of these tables the serial numbers given in thick bold type at the top of the vertical lines denote the unit-value of each respective permutation in number of the respective least (inferior) Anga or figure (Drutas in respect of Panchanga-prastara, Anudruta in respect of Shadanga-prastara and the general units in respect of Samyuktanga-prastara). The respective figures of Sankhya and Mahapatala are given below in the respective houses in bold and small types of figures respectively. In each group of tables while the first table furnishes the particulars of Akhanda-

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prastara, all the other remaining tables furnish the particulars of Khanda-prastara.

In each group of tables in the first 'Table of General permutations' the figures in the top horizontal line are the respective figures of Sankhya and Mahapatala shown in bold and small types of figures respectively and in the subsequent lower houses the numbers of the constituent Angas have been furnished in detail of which the grand total of each vertical line forms the figure of the respective Mahapatala. For example in the first table of Panchanga - prastara the vertical line having the bold figure '8' in the top indicates the 8–Drutas–permutation (8-DP) in which Kakapada stands in the first permutation and in which there are 61 permutations (Sankhya) in total consisting of 299 constituent Angas (Mahapatala) and as per the figures of the subsequent lower lines there are :

180 Drutas (total of the 1st proxies – 33+147 = 180)
91 Laghus (total of the 2nd proxies - 72+ 19= 91)
22 Gurus (total of the 4th proxies – 6+ 16= 22)
5 Plutas (total of the 6th proxies – 2+ 3= 5)
1 Kakapada (total of the 8th proxies – 1+---= 1)

---striking the grand – total of 299 Angas of Mahapatala.

In each group of tables, in the last table which is called Samyoga–meru or Table of combinative Angas, the figures of each horizontal line are the total numbers of permutations consisting the Anga or figure or combinations of Angas or figures written at the top of the vertical line. For example, in the 7th table of Panchanga – prastara from left towads right as per the general vertical line having thick bold figure '8' which denotes the 8–Druta–permutation there are bold type figures, 1, 1, 32, 1, 5, 3, 0, 12, 3, 2, & 1 which are

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the total numbers of permutations (Sankhya) pertaining to Druta, Laghu, Druta–Laghu, Guru, Druta - Guru, Laghu - Guru, Pluta, Druta - Laghu-Guru, Druta-pluta, Laghu - Pluta and Kakapada respectively as per the Anga or combination of Angas written at the top of the respective vertical line and the small type of figures, 8, 4, 189, 2, 25, 9, 0, 48, 9, 4 & 1 indicate the total numbers of constituent Angas (Mahapatala) of the above permutations respectively.

Apart from the first and last tables of each group of tables each other table furnishes the details of a particular Anga. In these tables while each vertical line, usually, belongs to a certain unit - value of permutation as per the thick bold type of figures written at the top, bold and small types of figures of each horizontal line furnishes the details of Sankhya and Mahapatala respectively consisting a particular number of a particular Anga as per the bold type of figure written at the extreme right. For example, as per the 2nd 'Table of Druta' of Panchanga - prastara the vertical line, wherein the thick bold type of figure '8' is written at the top, pertains to 8 - Drutas - permutation and from bottom to top the bold type of figures, 8, 0, 25, 0, 20, 0, 7, 0 & 1 and the respective small type of figures, 20, 0, 107, 0, 115, 0, 49, 0 & 8 are the figures of Sankhya and Mahapatala respectively pertaining to the permutations Deviod - of -Druta, consistent of 1 - Druta, 2-Drutas, 3-Drutas, 4-Drutas, 5 - Drutas, 6 - Drutas, 7 - Drutas and 8-Drutas as per the figures 0, 1, 2, 3, 4, 5, 6, 7 & 8 indicated in the extreme right of each horizontal line respectively from bottom to top of the table.

In the same manner the figures of all the tables should be applied and understood.

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Table showing the first -Angas of different units of value in different modes of permutation

Units	Panchanga	Shadanga					Samyuktanga					Units
	2	3	4	5	7	9	3	4	5	7	9	
1	0	U	U	U	U	U	U	U	U	U	U	1
2	1	0	0	0	0	0	0	0	0	0	0	2
3	01	1	U0	U0	U0	U0	1	४	४	४	४	3
4	5	U1	1	00	00	00	५	1	8	8	8	4
5	05	01	U1	1	U00	U00	९	५	1	४	४	5
6	5̇	5	01	U1	000	000	६	९	५	8	8	6
7	05̇	U5	U01	01	1	U000	४	६	९	1	४	7
8	+	05	5	U01	U1	0000	४	5	६	५	४	8
9	0+	5̇	U5	001	01	1	5̇	४	४	९	1	9
10	1+	U5̇	05	5	U01	U1	४	४	5	६	५	10
11	01+	05̇	U05	U5	001	01	४	४	४	४	९	11
12	5+	+	5̇	05	U001	U01	+	5̇	४	४	६	12

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Chapter - 3
Application of Prastara

3.1. PANCHANGA - PRASTARA

In this mode of Panchanga - prastara five Angas, Druta, Laghu, Guru, Pluta and Kakapada should be used in the process of permutation and this is prescribed for permuting the Angas of Chaturashra-jati only.

3.1.1. AKHANDA - PRASTARA

3.1.1.1. Anuloma - Prastara : - Example :- 4 - D P (4 - Drutas - permutation)

1st Prastara :- As per rule No. 1 write Guru in the units' column (S).

2nd Prastara :- As per rule No. 4, just below the Guru of the units' column write one Laghu and as per rule No. 5 write another Laghu in the tens' column (II).

3rd prastara :- Write one Druta in the tens' column as per rules Nos. 2 & 4, write another Druta in the hundreds' column as per rule No. 5 and one Laghu in the units'column as per rule No. 7.(001).

4th Prastara :- Write one Druta in the units' column as per rules Nos. 3 & 4, one Laghu in the tens'

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column and one Druta in the hundreds' column as per rule No. 6 (010).

5th prastara :- Write one Druta in the tens' column as per rules Nos. 3 & 4, one Laghu in the hundreds' column as per rule No. 6 and one Druta in units' column as per rule No. 7 (010).

6th Prastara :- Write one Druta in the hundreds' column as per rule No. 4, another Druta in the thousands' column as per rule No. 5 and one Druta each in tens' and units' columns as per rule No. 7 (0000).

By now as per rule No. 8 the process of permutation of 4 - DP is over resulting six kinds of prastaras, in total. In all these varieties the total value of Angas is '8' as per rule No. 9. Among these six prastaras, the 1st prastara is Gurvanta - prastara, 2nd and 3rd are Laghvanta - prastaras, 4th, 5th and 6th prastaras are Drutanta - prastaras and the last one is called 'Sarva - Drutanta - prastara (All - Druta - ending - permutation-ADEP).

3.1.1.2. Viloma - prastara :- Example :- 4-DP.

1st prastara : - As per rule No. 1 write four Drutas in the thousands', hundreds', tens' and units' columns respectively (0000).

2nd prastara :- As per rules Nos. 2, 3 & 4 write Laghu in the tens' column and as per rule No. 6 write Druta in each of hundreds' and thousands' columns (100).

3rd prastara :- As per rules Nos. 2, 3 & 4 write Laghu in the hundreds' column, write Druta in tens' column as per rule No. 5 and write another Druta in thousands' column as per rule No. 6(010).

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4th prastara :- As per rules Nos. 2, 3 & 4 write Laghu in the thousands' column and write Druta each in tens' and hundreds' columns as per rule No. 5 (001).

5th prastara :- As per rules Nos. 2, 3 & 4 write Laghu in the hundreds' column and write another Laghu in thousands'column as per rule No. 6(II).

6th prastara :- As per rules Nos. 2, 3 & 4 write Guru in the thousands' column (S).

As per rule No. 7 this Guru is the only possible superior Anga of 4-DP and as per rule No. 8 all these six permutations carry the same value of 4–DP.

In the same manner the process of all modes of permutation should be followed. More examples have been furnished at the end of this book.

T.1. TABLE OF GENERAL-PERMUTATIONS

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	6	10	19	33	61	108	196	350	632
	1	3	7	16	34	72	147	299	596	1182	2316	4517

T.1.1. Sankhya :– Key-rule :– The total of all the existing 1st, 2nd, 4th, 6th, and 8th proxies which represent the Drutanta-prastaras, Laghvanta- prastaras, Gurvanta -prastaras, Plutanta-prastaras and Kakapadanta–prastaras respectively, should be written (refer table–1).

Example :- At the first instance write the figure '1' to the left of the extreme left house as per General-key–rule mentioned in the 'Important-technical-terms, abbreviations and signs used in this book'.

1st house :– Write the existing 1st proxy, '1'.

2nd house :– Write the total of all the existing 1st and 2nd proxies (1+1=2).

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3rd house :– Write the total of all the existing 1st and 2nd proxies (2+1=3).

4th house :– Write the total of all the existing 1st, 2nd and 4th proxies (3+2+1=6).

5th house :– Write the total of all the existing 1st, 2nd and 4th proxies (6+3+1=10).

6th house :– Write the total of all the existing 1st, 2nd, 4th and 6th proxies (10+6+2+1=19).

7th house :– Write the total of all the existing 1st, 2nd, 4th and 6th proxies (19+10+3+1=33).

8th house :– Write the total of all the existing 1st, 2nd, 4th, 6th and 8th proxies (33+19+6+2+1 =61).

In the above manner write the figures of 'Sankhya' of all the tables pertaining to all the other modes of permutation using the respective proxies.

T.1.2. Mahapatala :– Key-rule :– The total of all the 1st, 2nd, 4th, 6th and 8th proxies of both 'Sankhya and Mahapatala' should be written. While doing so, the figure '1' to the extreme left of 'Sankhya', which has been written as per the general–key–rule, should also be taken into account even if its corresponding figure of 'Mahapatala' does not exist (refer table–1).

Example :–

1st house :– As the figure '1' to the extreme left of 'Sankhya' is only existing write figure '1' only.

2nd house :– Write the total of the 1st proxies of both 'Sankhya and Mahapatala' and the 2nd proxy of 'Sankhya' of the extreme left (1+1+1=3).

3rd house :– Write the total of the 1st and 2nd proxies of both 'Sankhya and Mahapatala' (3+2+1+ 1=7).

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4th house :– Write the total of the 1st and 2nd proxies of both 'Sankhya and Mahapatala' and the 4th proxy of 'Sankhya' at the extreme left (7+3+3+2+1=16).

5th house :– Write the total of the 1st, 2nd and 4th proxies of both 'Sankhya and Mahapatala' (16+6+7+3+1+1=34).

6th house :– Write the total of the 1st, 2nd and 4th proxies of both 'Sankhya and Mahapatala' and the 6th proxy of 'Sankhya' at the extreme left (34+10+16+6+3+2+1=72).

7th house :– Write the total of the 1st, 2nd, 4th and 6th proxies of both 'Sankhya and Mahapatala' (72+19+34+10+7+3+1+1=147).

8th house :– Write the total of the 1st, 2nd, 4th and 6th proxies of both 'Sankhya and Mahapatala' and the 8th proxy of 'Sankhya' at the extreme left (147+33+72+19+16+6+3+2+1=299).

9th house :– Write the total of the 1st, 2nd, 4th, 6th and 8th proxies of both 'Sankhya and Mahapatala' (299+61+147+33+34+10+7+3+1+1=596).

In the above manner write the figures of 'Mahapatala' of all the tables pertaining to all the other modes of permutation using the respective proxies.

3.1.2 : KHANDA-PRASTARA

3.1.2.1. Heena–prastara :–

3.1.2.1.1. Anuloma-prastara :– Example :– Devoid of Druta permutations (DDP) of 8–DP.

Note :– Since this is exclusively the process of DDPs each and every permutation should be devoid of Druta,

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1st prastara :– According to Akhanda-prastara since the 1st prastara is devoid of Druta write the same in the 1st prastara (+).

2nd prastara –: According to Akhanda-prastara since the 2nd prastara is also devoid of Druta write the same in the 2nd prastara (IS).

3rd prastara :– According to Akhanda-prastara if the Laghu which is in the tens' coloumn of 2nd prastara is further permuted it results in two Drutas which is contrary to the main principle of arriving at any prastara devoid of Druta. So, without permuting the Laghu which is in the tens' column the Pluta which is in the units' column should only be permuted by writing one Guru in the units' column and another Guru in the tens' column as per rule No. 6 (SS).

4th prastara :– According to Akhanda-prastara as per rules Nos. 4&5 write one Laghu each in tens' and hundreds' columns and write Guru in the units' column as per rule No. 7 (IIS).

5th prastara :– Further permuting the Laghus in the hundreds' and tens' columns of the 4th prastara results in Drutas. So, the Guru in the units' column should only be permuted and thus write one Laghu in the units' column as per rule No. 4 and write one Pluta in the tens' column as per rule No. 6 (SI).

6th prastara :– Write as in Akhanda-prastara (ISI).

7th prastara :– Further permuting the Laghu in the hundreds' column of 6th prastara results in writing Drutas, so avoiding it the Guru in the tens' column should only be permuted and thus write one Laghu in the tens' column as per rule No. 4, write one Guru in the hundreds' column as per rule No. 6 and write another Laghu in the Units' column as per rule No. 7 (SII).

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8th prastara :- Write as in Akhanda - prastara and no further permutation should be made as it results in contrary to the main principle of avoiding Druta (I I I I).

3. 1. 2. 1. 2. Viloma - prastara :- Example :- DDP of 8-DP.

1st prastara :- As per rule No. 1 write Laghus in each of units', tens', hundreds' and thousands' columns equal to the value of 8-DP (I I I I).

2nd prastara :- As per rules Nos, 2, 3 & 4 write Guru in hundreds' column and write one Laghu each in units' and tens' columns as per rule No. 6 (SII).

3rd prastara :- As per rules Nos. 2, 3 & 4 write Guru in tens' column, write Laghu in hundreds' column as per rule No. 5 and write another Laghu in units' column as per rule No. 6 (ISI).

4th prastara :- As per rules Nos. 2, 3 & 4 write Pluta in tens' column and write Laghu in units' column as per rule No. 6 (S$\underset{|}{I}$).

5th prastara :- As per rules Nos. 2, 3 & 4 write Guru in units' column and write Laghu each in tens' and hundreds' columns as per rule No. 5 (IIS),

6th prastara :- As per rules Nos. 2, 3 & 4 write Guru in the tens' column and write another Guru in units' column as per rule No. 6 (SS).

7th Prastara :- As per rules Nos. 2, 3 & 4 write Pluta in units' column and write Laghu in tens' column as per rule No. 5 (I$\underset{|}{S}$).

8th prastara :- As per rules Nos. 2, 3 & 4 write Kakapada in units' column (+).

As per rule No. 7 this Kakapada is the possible superior Anga of 8-DP and as per rule No. 8 all these eight prastaras carry the same value of 8-DP.

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3.1.2.2. Yukta - prastara :-

3.1.2.2.1. Anuloma - prastara :- Example :- Two-Druta - Consitent - permutations (2-DCPs) of 6-DP.

Note :- As this is the process of 2-DCPs, each and every prastara should invariably consist of two Drutas.

1st Prastara :- According to Akhanda - prastara, if a Pluta is written at the first instance this prastara becomes absolutely devoid of Druta which is contrary to the principle and so to make it 2-DCP write one Guru in the units' column and one Druta each in tens' and hundreds' columns (00S).

2nd Prastara :- According to Akhanda - prastara, as per rule No. 4 the Guru in the units' column should be permuted and a Laghu should be written in the units' column but later, as per rule No. 6 since writing a Guru results in contrary to the principle, write another Laghu in the tens' column and one Druta each in hundreds' and thousands' columns (0011)

3rd prastara :- Write as in Akhanda - prastara (0101)

4th prastara :- Write as in Akhanda -prastara (1001).

5th prastara :- Further permuting the Laghu in the thousands' column is contrary to the principle, as it results in more number of Drutas, as per rules Nos. 4 & 6 the Laghu in the units' column should only be permuted and thus write Druta, Guru and Druta in units' tens' and hundreds' columns respectively (0S0).

6th prastara :– Write as in Akhanda–prastara (0110).

7th prastara :– Write as in Akhanda–prastara (1010).

8th prastara :– Since it is contrary to the principle to permute the Laghu in the thousands' column

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as it results in more number of Drutas permute the Laghu which is in the tens' column only and write one Druta in the tens' column and one Guru in the hundreds' column as per rules Nos. 4 & 6 and write another Druta in the units' column as per rule No. 7 (S00).

9th prastara :– Write as in Akhanda–prastara (1100).

This process of permutation should not be continued as it is contrary to the principle.

3.1.2.2.2. Viloma – prastara :– Example :– 2-DCPs of 6–DP.

1st prastara :– As per rule No, 1 write Druta in each of units' and tens' columns and write Laghu in each of hundreds' and thousands' columns (1100).

2nd prastara :– As per rules Nos. 2, 3 & 4 write Guru in hundreds' column and write Druta each in units' and tens' columns as per rule No. 6 (S00).

3rd prastara : As per rules Nos. 2, 3 & 4 write Laghu in tens' column, write Druta and Laghu in hundreds' and thousands' columns respectively as per rule No. 5 and write Druta in units' column as per rule No. 6 (1010).

4th prastara : As per rules Nos. 2, 3 & 4 write Laghu in hundreds' column, write Druta in thousands' column as per rule No. 5 and write Druta in units' column as per rule No. 6 (1100).

5th prastara : As per rules Nos. 2, 3 & 4 write Guru in tens' column, write Druta in hundreds' column as per rule No. 5 and write another Druta in units' column as per rule No. 6 (0S0).

6th prastara :– As per rules Nos. 2, 3 & 4 write Laghu in units' column and write Druta each in

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tens' and hundreds' columns and Laghu in thousands' column as per rule No. 5 (1001).

7th prastara : As per rules Nos. 2. 3 & 4 write Laghu in hundreds' column, write Druta in thousands' column as per rule No. 5 and write Laghu and Druta in units' and tens' columns respectively as per rule No. 6 (0101).

8th prastara :– As per rules Nos. 2, 3 & 4 write Laghu in tens' column, write Druta each in hundreds' and thousands' columns as per rule No. 5 and write another Laghu in units' column as per rule No. 6 (0011)

9th prastara :– To make it 2–DCP write Guru in units' column as per rules Nos. 2, 3 & 4 and write Druta each in tens' and hundreds' columns as per rule No. 5 (00S).

As per rule No. 7 this is the series consisting the possible superior Angas without violating the restriction of 2–DCP and as per rule No. 8 all these nine permutations carry the same value of 6–DP.

The above method should be applied to all the other modes of permutation also.

T.2. DRUTA-MERU (TABLE OF DRUTA)

1	2	3	4	5	6	7	8	9	10	11	12	
	1	0	3	0	9	0	25	0	66	0	165	2
	2	0	9	0	33	0	107	0	321	0	903	
	1	0	2	0	5	0	12	0	28	0	62	0	1
	1	0	4	0	13	0	38	0	104	0	268	0	
1	0	1	0	2	0	4	0	8	0	15	0	29	0
	0	1	0	3	0	8	0	20	0	47	0	107	

Key-rules :–

Lowest - line :–

1. Sankhya :– The total of the existing respective proxies, except the 1st proxy, it being the

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table of the 1st Anga should be written (refer table - 2).

Note :– As per the general-key-rule mentioned in the 'Important technical terms, abbreviations & signs used in this book' write figure '1' to the left of the extreme left house.

1st house :– As none of the proxies is existing write 'O'.

2nd house :- Write the existing 2nd proxy '1'.

3rd house :- Write the existing 2nd proxy 'O'.

4th house :- Write the total of the existing 2nd and 4th proxies (1+1=2).

5th house :- Write the total of the existing 2nd and 4th proxies (0+0=0).

6th house :- Write the total of the existing 2nd, 4th and 6th proxies (2+1+1=4).

7th house :- Write the total of the existing 2nd, 4th and 6th proxies (0+0+0=0).

8th house :- Write the total of the existing 2nd, 4th, 6th and 8th proxies (4+2+1+1=8).

2. Mahapatala :- The total of the respective proxies of both 'Sankhya and Mahapatala', except the 1st proxies, they being the houses of 1st Anga, should be wriften.

1st house :- As none of the proxies is existing write 'O'.

2nd house :- Write the existing 2nd proxy '1' of 'Sankhya', which is in the left of the extreme left house.

3rd house :- As only zeros are existing write 'O'.

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4th house :- Write the total of the 2nd proxies of both 'Sankhya and Mahapatala' and the 4th proxy of 'Sankhya' (1+1+1=3).

5th house :- As only zeros are existing write 'O'.

6th house :- Write the total of the 2nd and 4th proxies of both 'Sankhya and Mahapatala' and the 6th proxy of 'Sankhya' (3+2+1+1+1=8).

7th house : As only zeros are existing write 'O'.

8th house :- Write the total of the 2nd, 4th and 6th proxies of both 'Sankhya and Mahapatala' and the 8th proxy of Sankhya (8+4+3+2+1+1+1=20)

Upper – lines :–

1. Sankhya :– The total of the existing respective proxies of the same line and only the 1st proxy from the immediate lower - line should be written.

First upper - line of 1–DCPs :–

1st house :- Write the existing 1st proxy of the immediate lower - line '1'. which is to the left of the extreme left house.

2nd house :– As only zero is existing write 'O'.

3rd house :– Write the total of the existing 1st (lower) and 2nd proxies (1+1=2).

4th house .– As only zeros are existing write 'O'.

5th house :- Write the total of the existing 1st (lower), 2nd and 4th proxies (2+2+1=5).

6th house :– As only zeros are existing write 'O'.

7th house :– Write the total of the existing 1st (lower), 2nd, 4th and 6th proxies (4+5+2+1=12)

8th house :– As only zeros are existing write 'O'.

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9th house :– Write the total of the existing 1st (lower), 2nd, 4th, 6th and 8th proxies (8+12+5+2+1 = 28).

2. Mahapatala :– The total of the existing respective proxies of both 'Sankya and Mahapatala' and only the 1st proxies from the immediate lower – line should be written.

1st house :– Write the existing 1st (lower) proxy '1', which is in the left of the extreme left.

2nd house :– As zeros only are existing write 'O'.

3rd house :- Write the total of the existing 1st (lower) and 2nd proxies of both 'Sankhya and Mahapatala' (1+1+1+1=4).

4th house :- As only zeros are existing write 'O'.

5th house :- Write the total of the existing 1st (lower), 2nd and 4th proxies of both 'Sankhya and Mahapatala' (3+2+4+2+1+1=13).

6th house :- As only zeros are existing write 'O'.

7th house :- Write the total of the existing 1st (lower), 2nd, 4th and 6th proxies of both 'Sankhya and Mahapatala' (8+4+13+5+4+2+1+1 = 38).

8th house :- As only zeros are existing write 'O'.

9th house :- Write the total of the existing 1st (lower), 2nd, 4th, 6th and 8th proxies of both 'Sankhya and Mahapatala' (20+8+38+12+13+5+4+2+1+1=104).

In the above manner, basing upon their respective proxies the figures of 'Sankhya and Mahapatala' should be written for all the other remaining tables.

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T.3. LAGHU-MERU (TABLE OF LAGHU)

	1	2	3	4	5	6	7	8	9	10	11	12	
	1 (1)	2 (4)	3 (9)	4 (16)	7 (29)	12 (54)	21 (101)	34 (182)	56 (322)	90 (510)	145 (915)		1
1	1 (1)	1 (2)	1 (3)	2 (5)	3 (9)	5 (16)	7 (27)	11 (45)	16 (74)	24 (121)	35 (195)	53 (314)	0

Key-rules :-

Lowest-line :-

1. **Sankhya :-** The total of the existing respective proxies, except the 2nd proxy, it being the table of 2nd Anga, should be written (refer table-3).

2. **Mahapatala :-** The total of the existing respective proxies of both 'Sankhya and Mahapatala', expept the 2nd proxies, they being the houses of 2nd Anga, should be written.

Upper-lines :-

1. **Sankhya :-** The total of the existing respective proxies and only the 2nd proxy from the immediate lower-line, should be written.

2. **Mahapatala :-** The total of the existing respective proxies of both 'Sankhya and Mahapatala' and only the 2nd proxies from the immediate lower-line, should be written.

T.4. GURU-MERU (TABLE OF GURU)

	1	2	3	4	5	6	7	8	9	10	11	12	
				1 (1)	2 (4)	5 (13)	10 (34)	20 (82)	38 (184)	73 (399)	136 (836)	255 (1719)	1
1	1 (1)	2 (3)	3 (7)	5 (15)	8 (30)	14 (59)	23 (113)	40 (215)	67 (403)	114 (750)	192 (1382)	325 (2531)	0

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Key-rules :-

Lowest-line :-

1. Sankhya :- The total of the existing respective proxies, except the 3rd proxy, it being the table of 3rd Anga, should be written (refer table-5).

2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Mahapatala', except the 3rd proxies, they being the houses of 3rd Anga, should be written.

Upper-lines :-

1. Sankhya :- The tolal of the existing respective proxies and only the 3rd proxy from the immediate lower line should be written.

2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Mahapatala' and only the 3rd proxies from the immediate lower-line, should be written.

T.5. PLUTA-MERU (TABLE OF PLUTA)

1	2	3	4	5	6	7	8	9	10	11	12	
					1	2	5	10	22	44	89	1
					1	4	13	34	86	202	461	
1	1	2	3	6	10	18	31	56	98	174	306	542	0
	1	3	7	16	34	71	143	286	562	1076	2114	4054	

Key-rules :-

Lowest-line :-

1. Sankhya :- The total of the existing respective proxies, except the 4th proxy, it being the table of 4th Anga, should be written (refer table-5).

2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Mahapatala''

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except the 4th proxies, they being the houses of 4th Anga, should be written.

Upper-lines :-

1. Sankhya :- The total of the existing respective proxies and only the 4th proxy from the immediate lower-line, should be written.

2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Mahapatala' and only the 4th proxies from the immediate lower-line, should be written.

T. 6. KAKAPADA-MERU (TABLE OF KAKAPADA)

	1	2	3	4	5	6	7	8	9	10	11	12	
								1 (1)	2 (4)	5 (13)	10 (34)	22 (86)	1
1	1 (1)	2 (3)	3 (7)	6 (16)	10 (34)	19 (72)	33 (147)	60 (298)	106 (572)	191 (1169)	340 (2282)	610 (4431)	0

Key-rules :-

Lowest-line :-

1. Sankhya :- The total of the existing respective proxies, except the 5th proxy, it being the table of 5th Anga, should be written (refer table - 6).

2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Mahapatala', except the 5th proxies, they being the houses of the 5th Anga, should be written.

Upper-lines :-

1. Sankhya :- The total of the existing respective proxies and only the 5th proxy from the immediate lower-line, should be written.

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2. Mahapatala :- The total of the existing respective proxies of both 'Sankhya and Maha–patala' and only the 5th proxies from the immediate lower–line, should be written.

T.7. SAMYOGA - MERU (TABLE OF COMBI-NATIVE - ANGAS)

The details of all the permutations of individual Angas and the interbred combinations of different Angas under systematic groups have been furnished in the 'Table of the series of combinative - angas or figures'. Basing upon the series of combinations pertaining to Panchanga - prastara furnished in the above table this Samyoga - meru is written (refer table - 7).

T.7.1. Sankhya:- T.7.1.1. Key-rules for the vertical lines:-

1. In the vertical lines of individual Angas of IAEPs (Identical - Anga-ending - permutations) write figure '1' in each of the houses pertaining to the proxy and its multiples of the Anga concerned.

2. For the vertical lines consisting the combinations of two Angas the total of the existing respective proxies of the same vertical line along with the existing 'Sankhya' figures of the corresponding individual Anga's line pertaining to the 'Specified-numbers' of upper - horizontal - lines mentioned in the 'Table of certain particulars pertaining to the combinations of two Angas or figures' should be written.

IMPORTANT - NOTE :-

Write figure '2' in the very first house and figure '3' in the next or, if necessary, leaving - off the in - between zeros, in further next house, carefully observing the rules.

3. For the vertical lines consisting the combinations of three or more Angas the total of the existing

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respective upper proxies of the same vertical line along with the existing corresponding serial figures mentioned in the other vertical lines, pertaining to the interbred combinations of the respective upper proxies of the same vertical line should be written.

T. 7. 1. 2. Key-rules for obtaining the 'Specified-number' of the upper - horizontal - lines of single Angas and figures :-

1. List out the possible combinations consisting two different Angas under systematic groups.

2. In any combination of two Angas treating the proxy of the lower Anga as 'standard - unit - value', ascertain the total number of such standard - units of value of the proxy of the higher Anga. Any fraction should be rounded - off to the next immediate multiple of the standard - unit.

NOTE :- Particulars of 'Specified - numbers' and 'Interval - units' relating to the combinations of two Angas have seperately been furnished in the 'Table of certain particulars pertaining to the combinations of two Angas or figures' and the particulars of its columns of a, b, c, d & e are as follows (see also chapter-IV-2):

(a) Combination of two Angas or figures.

(b) Specified-number of upper-horizontal- line pertaining to the figure of IAEP of lower Anga.

(c) Specified-number of upper-horizontal-line pertaining to the figure of IAEP of higher Anga.

(d) Number of the Interval-unit to be, in general, added to or subtracted from the total of Mahapatala.

(e) Number of the Interval–unit to be added to or subtracted from the total of Mahapatala if it is included in the figure of IAEP of higher Anga.

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T.7.1.3. METHOD OF APPLICATION OF THE KEY-RULES (VERTICAL-LINES) :-

1. D-line :- The total number of ADEPs (All-Druta-ending-permutations) is furnished in this line and as per rule No. 1 write figure '1' in each house since the proxy of Druta is '1'.

2. L-line :- The total number of ALEPs is furnished in this line and as per rule No. 1 write figure '1' in each 2nd house since the proxy of Laghu is '2'.

3. DL-line :- The total number of prastaras derived from the interbred combinations of Druta and Laghu i.e., Druta-Laghu or Laghu-Druta, is mentioned in this line and as per rule No. 2 write figures '2' and '3' in the 1st and 2nd houses respectively.

3rd house :- As per rule No. 2 write the total of the respective upper 1st and 2nd proxies representing Druta and Laghu of the same vertical line in addition to the existing figures of the corresponding D-line and L-line of the 1st upper-horizontal- line being the 'Specified-number' of the upper-horizontal-line (3+2+1+1=7).

4th house :- As per rule No. 2 write the total of the respective upper 1st and 2nd proxies representing Druta and Laghu of the same vertical line in addition to the existing figures of the corresponding D-line (figure of L-line is not existing) of the 1st upper-horizontal-line as above (7+3+1=11).

In the same manner figures upto the required prastara and also of other lines pertaining to the combinations of two Angas could be written.

4. G-line :- The total number of AGEPs is furnished in this line and as per rule No. 1 write figure '1' in each 4th house since the proxy of Guru is '4'.

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5. DG-line :- The total number of the interbred combinations of Druta and Guru is mentioned in this line and as per rule No. 2 the figures should be written.

6. LG-line :- The total number of the interbred combinations of Laghu and Guru is mentioned in this line and as per rule No. 2 the figures should be written.

7. P - line :- The total number of APEPs is furnished in this line and as per rule No. 1 write figure '1' in each 6th house since the proxy of Pluta is '6'.

8. DLG - line :- The total number of the interbred combinations of Druta, Laghu and Guru is mentioned in this line and as per rule No. 3 the total of the existing 1st, 2nd and 4th proxies of the same vertical line and the existing corresponding serial figures of DL, DG and LG lines should be written.

1st house :- As per rule No. 3 since the respective upper proxies of the same vertical line are not existing, write the total of the corresponding 1st figures of the vertical lines pertaining to the interbred combinations of DL, DG and LG (2+2+2 = 6).

2nd house :- As per rule No. 3, write the total of the existing 1st upper proxy in addition to the corresponding 2nd figures (as this is the 2nd house) of the vertical lines pertaining to the interbred combinations of DL, DG and LG (6+3+3+0 = 12).

3rd house :- As per rule No. 3, write the total of the preceding upper 1st and 2nd proxies of the same vertical line in addition to the corresponding 3rd figures (as this is the 3rd house) of the vertical lines pertaining to the interbred combinations of DL, DG and LG (12+6+7+4+3 = 32).

In the same manner figures upto the required prastara and also of other lines pertaining to the combinations of three Angas or more could be written.

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9. DP-line :- The total number of the interbred combinations of Druta and Pluta is furnished in this line and as per rule No. 2 the figures should be written.

10. LP - line :- The total number of the interbred combinations of Laghu and Pluta is furnished in this line and as per rule No. 2 the figures should be written.

11. K - line :- The total number of AKEPs is furnished in this line and as per rule No. 1 write figure '1' in each 8th house since the proxy of Kakapada is '8'.

12. DLP - line :- The total number of the interbred combinations of Druta, Laghu and Pluta is furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd and 6th proxies of the same vertical line and the existing corresponding serial figures of DL, DP and LP lines should be written.

13. DK – line :- The total number of the interbred combinations of Druta and Kakapada is furnished in this line and as per rule No. 2 the figures should be written.

14. GP - line :- The total number of the interbred combinations of Guru and Pluta is furnished in this line and as per rule No. 2 the figures should be written.

15. LK - line :- The total number of the interbred combinations of Laghu and Kakapada is furnished in this line and as per rule No. 2 the figures should be written.

16. DGP - line :- The total number of the interbred combinations of Druta, Guru and Pluta is furnished in this line and as per rule No. 3 the total of the existing 1st, 4th and 6th proxies of the same vertical line and the existing corresponding serial figures of DG, DP and GP lines should be written.

17. DLK - line :- The total number of the interbred combinations of Druta, Laghu and Kakapada is

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furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd and 8th proxies of the same vertical line and the existing corresponding serial figures of DL, DK and LK lines should be written.

18. LGP - line :- The total number of the interbred combinations of Laghu, Guru and Pluta is furnished in this line and as per rule No. 3 the total of the existing 2nd, 4rh and 6th proxies of the same vertical line and the existing corresponding serial figures of LG, LP and GP lines should be written.

19. GK - line :- The total number of the interbred combinations of Guru and Kakapada is furnished in this line and as per rule No. 2 the figures should be written.

20. DLGP - line :- The total number of the interbred combinations of Druta, Laghu, Guru and Pluta is furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd, 4th and 6th proxies of the same vertical line and the existing corresponding serial figures of DLG, DLP, DGP and LGP lines should be written.

21. DGK - line :- The total number of the interbred combinations of Druta, Guru and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 4th and 8th proxies of the same vertical line and the existing corresponding serial figures of DG, DK and GK lines should be written.

22. LGK - line :- The total number of the interbred combinations of Laghu, Guru and Kakapada is furnished in this line and as per rule No. 3 the total of existing 2nd, 4th and 8th proxies of the same vertical line and the existing corresponding serial figures of LG, LK and GK lines should be written.

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23. PK-line :- The total number of the interbred combinations of Pluta and Kakapada is furnished in this line and as per rule No. 2 the figures should be written.

24. DLGK-line :- The total number of the interbred combinations of Druta, Laghu, Guru and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd, 4th and 8th proxies of the same vertical line and the existing corresponding serial figures of DLG, DLK, DGK and LGK lines should be written.

25. DPK-line :- The total number of the interbred combinations of Druta, Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of DP, DK and PK lines should be written.

26. LPK-line :- The total number of the interbred combinations of Laghu, Pluta and Kakapada is furnished in this line and as per rule No.3 the total of the existing 2nd, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of LP, LK and PK lines should be written.

27. DLPK-line :- The total number of the interbred combinations of Druta, Laghu. Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of DLP, DLK, DPK and LPK lines should be written.

28. GPK-line :- The total number of the interbred combinations of Guru, Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 4th, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of GP, GK and PK lines should be written.

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29. DGPK-line :- The total number of the inter-bred combinations of Druta, Guru, Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 4th, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of DGP, DGK, DPK and GPK lines should be written.

30. LGPK-line :- :- The total number of the inter-bred combinations of Laghu, Guru, Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 2nd, 4th, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of LGP, LGK, LPK and GPK lines should be written.

31. DLGPK-line :- The total number of the inter-bred combinations of Druta, Laghu, Guru, Pluta and Kakapada is furnished in this line and as per rule No. 3 the total of the existing 1st, 2nd, 4th, 6th and 8th proxies of the same vertical line and the existing corresponding serial figures of DLGP, DLGK, DLPK, DGPK and LGPK lines should be written.

In the same manner the figures of all the 'Tables of combinative Angas' could be written.

T.7.2. MAHAPATALA :- T.7.2.1. KEY - RULES FOR THE VERTICAL LINES (See also chapter-IV-2) :-

1. In each of the vertical lines of IAEPs write figures serially, in ascending order of value starting from figure '1' under each figure '1' of 'Sankhya' of each Anga leaving away the zeros, if any, in-between.

2. For the vertical lines pertaining to the combinations of two Angas arrive at the total of the existing respective figures of the upper proxies and their 'Mahapatala' of the same vertical line along with the existing figures of ONLY 'Mahapatala' (but not of 'Sankhya' at all) of the respective IAEPs pertaining to the 'Specified-numbers' of upper-lines mentioned in the

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'Table of certain particulars pertaining to the combinations of two Angas or figures' and making the necessary additions or deletions as per the respective number of 'Inrerval-units' furnished in the same table, write the remainder.

IMPORTANT-NOTE :- Irrespective of the figures obtained in the above general process, write figures '4 & 9' respectively for 'Sankhya' of '2 & 3' of the combinations of two Angas or figures. No number of 'Interval-unit' need be used if 'Mahapatala' of any IAEP is not utilised.

3. For the vertical lines consisting of the combinations of three or more Angas or figures, the total of both 'Sankhya and Mahapatala' of the existing respective upper proxies of the same vertical line along with 'Sankhya and Mahapatala' of the existing corresponding serial figures mentioned in the other vertical lines pertaining to the interbred combinations of the respective Angas or figures should be written. If the figures of the respective upper proxies of the same vertical line are not existing, the total of the corresponding serial figures mentioned in the other vertical lines, pertaining to the interbred combinations of the respective Angas, should alone be written.

T.7.2.2. KEY-RULES FOR OBTAINING THE 'INTERVAL-UNITS' :-

1. List out the possible combinations consisting of two different Angas or figures.

2. In any combination of two Angas or figures, arrive at the ratio of the two respective proxies and in this process fraction, if any, pertaining to the proxy of higher Anga or figure should be rounded - off to the immediate next higher multiple of the proxy of the lower Anga or figure. For example, in Panchanga-prastara, the ratio of the proxies pertaining to the

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combination of Laghu - Kakapada (2/8) is 1:4 and in respect of the proxies pertaining to the combination of Guru - Pluta (4/6), as the proxy '6' of the higer Anga, Pluta, has become a fractional number (FN) in respect of the proxy '4' of the lower Anga, Guru and as such the above proxy '6' should be rounded - off to the immediate next higher multiple '8' of the above proxy '4', the ratio is 1:2.

3. Excluding the two figures of ratio of the proxies pertaining to the lower and higher Angas or figures the number of figures remaining in - between these two figures of ratio becomes the figure of 'Interval - units'. For example, in Panchanga-prastara, the ratio of the proxies pertaining to the combination of Druta -Kakapada (1/8) is 1:8 and if these two figures '1 and 8' of the ratio are deleted from the eight serial numbers starting from '1 to 8' i. e., 1-2-3-4-5-6-7-8, only '6' figures, 2 - 3 - 4 - 5 - 6 - 7, remain. Thus, '-6' (minus - six) is the figure of 'Interval - units' of Druta - Kakapada in the mode of Panchanga - prastara.

4. To arrive at the total of Mahapatala the same figure of 'Interval - units' should, as it is, be effected if Mahapatala of IAEPs of lower Anga or figure is also included in Mahapatala, but, '+1' (plus - one) should, at first, be effected to the figure of 'Interval - units' and the remainder should only be applied to Mahapatala if Mahapatala of IAEPs of higher Anga or figure is also included in Mahapatala i. e., for example for the figures of 'Interval - units like '-6, -5, -4, -3, -2, -1 &0' the same figure should, as it is, be effected by deducting the figures '6, 5, 4, 3, 2, 1 & 0' respectively from the total of Mahapatala and the remainder should only be written if Mahapatala of IAEPs of lower Anga or figure is included in Mahapatala, but, '+1' (plus - one) should, at first be effected to the above 'Interval-units, resulting in '-6+1 = -5, -5+1 =-4, -4+1 =-3, -3+1 =-2, -2+1 =-1 & 0+1 = 1' respectively and these remainders should, in turn, be effected to the total of

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Mahapatala and the last remainder only be written if Mahapatala of IAEPs of higher Anga or figure is also included in Mahapatala.

T.7.2.3. KEY-RULES FOR OBTAINING THE 'SPECIFIED-NUMBERS' OF THE UPPER-HORIZONTAL-LINES FOR TAKING 'MAHAPATALA' OF IAEPS INTO ACCOUNT :-

Always the proxy of the lower Anga or figure pertaining to the combination of two Angas or figures becomes the 'Specified-number' of the upper-horizontal -line for both lower and higher Angas or figures from which 'Mahapatala' of IAEPs should be taken into account. But, for fractional numbers of units, in respect of IAEPs of ONLY lower Anga or figure, the proxy of the least Anga or figure of that particular mode of permutation itself becomes the 'Specified-number, of the upper-horizontal-line.

T.7.2.4. METHOD OF APPLICATION OF THE KEY-RULES (vertical-lines) :-

1. D-line :- Write figures serially in ascending order of value starting from figure '1' under each figure '1' of 'Sankhya' as per rule No.1.

2. L-line :- Write figures serially in ascending order of value starting from figure '1' under each figure '1' or 'Sankhya' as per rule No. 1.

3. DL - line :- As per rule No. 2 write figures '4 & 9' in the 1st and 2nd houses respectively.

3rd house :- As per rule No. 2 arrive at the total of the preceding upper 1st and 2nd proxies representing Druta and Laghu respectively of the same vertical line along with their respective figures of 'Mahapatala' in addition to 'Mahapatala' of the corresponding ADEPs and ALEPs of the specified 1st upper - horizontal-line (3+9+2+4+4+2 = 24) and 'Interval - unit' figures, '0 & + 1' to the total figure '24' (24+0+1 = 25) as 'Mahapatala' of IAEPs of both lower and higher Angas are also included in it.

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4th house :- As per rule No. 2 write the total of the 1st and 2nd proxies representing Druta and Laghu respectively of the same vertical line along with their respective figures of 'Mahapatala' and 'Mahapatala' of the corresponding ADEPs of the specified 1st upper - horizontal - line (7+25+3+9+5=49) and add 'Interval - unit' figure '0' (49+0 = 49) as 'Mahapatala' of IAEPs of only lower Anga is also included in it.

4. G - line :- Write figures serially in ascending order starting from figure '1' under each upper figure '1' of 'Sankhya' as per rule No. 1.

7. P - line :- Write figures serially in ascending order starting from figure '1' under each upper figure '1' of 'Sankhya' as per rule No. 1.

8. DLG - line :- As per rule No. 3, since the figures of the respective upper proxies of the same vertical line and the figures of their 'Mahapatala' are not existing, write the total of the corresponding 1st figures (as the 1st figure of this is to be written) of both 'Sankhya' and 'Mahapatala' of the interbred comnations of DL, DG and LG lines (2+4+2+4+2+4=18).

2nd house :- As per rule No. 3 write the total of the existing 1st proxy representing Druta of the same vertical line along with its figure of 'Mahapatala' and the corresponding 2nd figures (as the 2nd figure of this line is to be written) of both 'Sankhya' and 'Mahapatala' of the interbred combinations of DL, DG and LG lines (6+18+3+9+3+9+0+0 = 48).

11. K - line :- Write figures serially in ascending order starting from figure '1' under each upper figure '1' of 'Sankhya' as per rule No. 1.

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14. GP - line :- Write zeros in 2nd, 3rd, 4th, 6th, 8th, 10th, 12th, 14th, 16th and 18th houses (calculations were made upto 19th house only) and as per rule No. 2 write figure '4' in the 1st house and '9' in the 5th and 7th houses.

9th house :- As per rule No. 2 write the total of the existing 4th proxy representing Guru along with its figure of 'Mahapatala' of the same vertical line and the existing corresponding AGEP - figure of 'Mahapatala' of the 2nd upper - horizontal - line (3+9+4 = 16).

11th house :- As per rule No. 2 write the total of 4th and 6th proxies representing Guru and Pluta along with their respective figures of 'Mahapatala' of the same vertical line (3+9+3+9 = 24).

13th house :- As per rule No. 2 write the total of 4th and 6th proxies representing Guru and Pluta along with their respective figures of 'Mahapatala' of the same vertical line and corresponding AGEP and APEP - figures of 'Mahapatala' of the 2nd and 4th upper - horizontal - lines (4+16 +3+9+5+3 = 40) and include figure '1' to the total figure (40+1 = 41) as the APEP - figure of higher Anga is also included in it.

17th house :- As per rule No. 2 write the total of 4th and 6th proxies representing Guru and Pluta along with their respective figures of 'Mahapatala,' of the same vertical line and the existing corresponding AGEP - figure of 'Mahapatala' of the 2nd upper - horizontal - line (9+41+6+24+ 6 = 86).

19th house :- As per rule No. 2 write the total of 4th and 6th proxies representing Guru and Pluta along with their respective figures of 'Mahapatala' of the same vertical line and the existing corresponding APEP - figure of 'Mahapatala' of

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the 4th upper - horizontal - line (10+50+9+41+4 = 114) and include figure '1' to the total figure (114+1 = 115) as the APEP - figure of higher Anga is also included in it.

In the above manner, all the figures upto the required prastara and the figures of other similar lines and figures of other tables also could be written.

3.2. SHADANGA - PRASTARA.

In this mode of Shadanga-prastara all the six Angas i.e., Anudruta, Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation. While Druta is the inferior (least) Anga in Panchanga-Prastara the Anudruta is the inferior Anga in this Shadanga-prastara. So, in this mode of permutation the process of permutation should always be continued on the lines of Panchanga-prastara until all the Angas become the inferior Angas, Anudrutas. Hence this last prastara is called AAEP (All-Anudruta-ending-permutation). This mode of permutation should be applied to all the Jatis i.e., Trisra, Chaturashra, Khanda, Mishra and Sankeerna Jatis, and all the required figures of all the different tables could be obtained basing upon the respective proxies (refer the 'Important tehnical-terms, abbreviations and signs used in this book' furnished in the beginning of this book) representing the six Angas respectively.

Relevant tables and examples pertaining to the process of permutation of Akhanda and Khanda-prastaras have been furnished at the end of this book.

If needed the relevant details of all other Visesha-Jatis (6, 8, 10, 12 & 16-units) also could be obtained basing upon the multiples of the respective proxies in the same manner.

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3.3. SAMYUKTANGA-PRASTARA

In the process of the Samyuktanga-prastara, in addition to the usual six Angas i.e,, Anudruta, Druta, Laghu, Guru, Pluta and Kakapada, various other combinations of two or more of these six Angas, formed by interlacing and writing one above the other, are also used. The synonyms of this mode of permutation are 'Mishramanga-prastara' and 'Mishritanga-prastara'. In this process of permutation, while following, as usual, the general rules of permutation, write an Anga or figure lesser by one unit than the above. In this mode of permutation an interlaced Anga should instantaniously be prepared, if necessary (like 'Tri-Druta-Virama' for the value of 7-units in Sankeerna-Jati or 'Laghu-Dvi-Druta' for the value of 9-units in Khanda-jati or 'Pluta-Dvi-Druta-Virama' for the value of 26-units in Mishra-jati). While in the other modes of permutation the process of permutation is applied with the Angas basing upon their respective Jatis, independent or interlaced Angas for any number of units could be framed and used in the process of this mode of permutation. To make this process of permutation easier to understand only numerals i.e., 1, 2, 3, 4, 5, 6 etc., are used and, if needed, they could be converted into independent or interlaced Angas according to the requirement of units.

Important-note :- In this mode of permutation Virama is not used in the sense of its textual tradition, but it is equated to one-unit of time appended to another Talanga.

Proxies :- The figures of all the preceding houses are the proxies in this mode of permutation. In this mode of permutataion tables should be prepared for 1-unit, 2-units, 3-units and so on for each and every unit in ascending order of value and the respective unit-number of that particular table is the proxy of that

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table which should be taken into account from the immediate lower-line for writing the figures of the upper-lines only (but not for the lowest-lines at all).

Relevant tables and examples pertaining to the process of permutation of Akhanda-prastara and Khanda prastara have been furnished at the end of this book.

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LIST OF EXAMPLES OF NASHTA, UDDISHTA & KALITA

A.NASHTA

1. Akhanda - prastara :-

(a) Anuloma :-
2-12-632-1 & 385
3-11-565-318
4-12-543-148
5-12-377-170
7-12-271-113
9-12-243-2
0- 8-128-67

(b) Viloma:-
2-12-632-632

(c) Madhyarupa:-
2-6-19-6
2-5-10-2
2-6-19-8
2-5-10-4

2. Khanda - prastara

(a) Anuloma :-
2-12-1-0-29-12 & 16
2- 8-1-2-25-2, 3, 5, 9, 12, 15,17,18, 20, 23, & 24
2-10-2-0-24-2 & 7
2- 8-2-1-21-3, 8, 13 & 18
2- 8-4-1-20-4 & 9
2-10-6-1-22-5 & 11
2-12-8-1-22-5- & 11
3-10-6-1-26-17
4- 8-4-1-20-16
5-10-2-1-29-8
7-12-2-1-31-11
9- 9-1-5-21-10 & 17
0- 9-1-0-21-1, 6, 12 & 19
0- 8-1-1-26-7,9,11,14 , & 16
0- 7-2-0-21-18
0- 7-2-1-26-12 & 17

(b) Viloma :-
2-12-1-0-29-18
2- 8-1-2-25-21

(c) Madhyarupa :-
2-12-1-0-29-3
2- 8-1-0- 8-2
2- 8-1-2-25-4
2- 9-1-1-28-7
2-12-1-0-29-1
2- 8-1-0- 8-3
2- 8-1-2-25-7
2- 9-1-1-28-9

B.UDDISHTA

1. Akhanda - prastara

(a) Anuloma :-
2-12- 632-I OS OI
3-12-1059- S I OU
4-12- 543-I O IO
5-12- 377-UIIU
7-12- 271- UCUUOUUOU
9-12- 243- OUOUOUOU
0-12-2048- 2 1 1 2 1 1 2 1 1

(b)Viloma :-
2-12-632- I O S O I

(c) Madhyarupa :-
2-6-19- S I
2-5-10-I O I
2-6-19-I O O O O
2-5-10-I O O O

2. Khanda - prastara

(a) Anuloma :-
2- 8-1-0-25- S S ; S I S ; S I S I ; + I I
2- 9-1-1-28- I O S ; S O S ; S O I I
2- 8-1-2-25- O I O S
3-10-1-1-32- S I U
0- 8-1-1-26- 2 3 1 2 ; 4 3 1 ;

(b) Viloma :-
2-12-1-0-29- I S I S
2- 8-1-2-25- O O S I

(c) Madhyarupa :-
2-12-1-0-29- I S I S
2- 8-1-0- 8- I S
2- 8-1-2-25- O S O I
2- 9-1-1-28- S O S
2-12-1-0-29- S S I
2- 8-1-0- 8- S I I
2- 8-1-2-25- S O I O
2- 9-1-1-28- S S O

C.KALITA

1. Akhanda - prastara :- 2-8-61

2. Khanda - prastara :-
2-12-1-0-29
2- 8-1-2-25

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Chapter - 4

Nashta, Uddishta & Kalita

In order to avoid the Himalayan task of undertaking the processes of all the permutations for which a human life is too short some very interesting and important easy methods have been furnished in this chapter to obtain (a) the series of Angas or figures of a particular number of prastara in question, (b) the serial number of a particular prastara in question consisting of a particular series of Angas or figures and (c) the details of all the Angas or figures used upto a particular number of prastara in question, with the help of some figures. They have been named as 'Nashta' Uddishta and Kalita' respectively which have been elaborated hereunder along with the relevant rules and examples.

4.1. NASHTA

The easy method of obtaining the series of Angas or figures of prastara consisting of a particular serial number in question, with the help of the figures of 'Sankhya', is called 'Nashta'.

RULES FOR ANSWERING NASHTA

1. Write the 'Sankhya' line of figures upto the required units of permutation.

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2. (a) Anuloma-nashta :- Subtract the question number of the required prastara from Anuloma-sankhya and from the remainder subtract the respective proxies consecutively.

(b) Viloma-nashta :- Subtract figure '1' from the question number of the required prastara and from the remainder subtract the respective proxies consecutively.

(c) Madhyarupa (middle-numbers)-nashta :-

NOTE :- The exact middle-number of the prastaras for the 'Sankhya' of odd-number and the Anuloma-serial-number of the last prastara of the first-half for the 'Sankhya' of even-number is always called the prastara of the 'Midmost-number (MN)' and this should always be excluded while counting the upper or lower numbers of prastaras of the MN.

This is of two kinds and they are (i) Uparisthita-nashta pertaining to the upper-numbers of the MN (UMN) and (ii) Athasthita-nastha pertaining to the lower-numbers of the MN (LMN).

(i) Uparishita-nashta :- For 'Sankhya' of both odd and even numbers obtain the Viloma-serial-number of the prastara in question from the MN and add it to the MN and for 'Sankhya' of odd-numbers further subtract figure '1' also from the above total and later from the last figure subtract the respective proxies consecutively.

(ii) Athasthita-nashta :- For 'Sankhya' of both odd and even numbers obtain the Anuloma-serial-number of the prastara in question from the MN and subtract it from the MN and for 'Sankhya' of odd-number further subtract figure '1' also from the above remainder and later from the last figure subtract the respective proxies consecutively.

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3. If the first proxy is not subtracted write the Anga or figure of the first proxy and the same process should be continued until a proxy is subtracted.

4. If the first-proxy is subtracted write the Anga or figure of the second consecutive proxy and leave away the second consecutive proxy. But, for the consecutive subtraction of two proxies write the Anga or figure of the third consecutive proxy and leave away the third consecutive proxy. But, for the consecutive subtraction of three proxies write the Anga or figure of the fourth consecutive proxy and leave away the fourth consecutive proxy. In the same manner for the consecutive subtraction of more number of proxies write the Anga or figure of the immediate next consecutive proxy of the last consecutive proxy and leave away its proxy (including the omitted number of proxy of the lowest-lines in respect of the table of Khanda-prastara of Samyuktanga-prastara).

NOTE :- If any proxy, other than the first, could not consecutively be subtracted along with its preceding proxy, being a figure bigger than the remainder, such un-deducted proxy becomes the proxy to be left-off.

5. (a) After getting (a) an un-deducted proxy (being a figure bigger than the remainder) or (b) a left-off proxy (a figure which has to be left-off after obtaining an Anga or figure, by not being deducted from the remainder, being bigger than the remainder) further Angas or figures should be written basing upon the respective proxies of such un-deducted or left-off proxy by subtracting them consecutively starting again from the beginning and carefully observing the relevant rules and restrictions in writing the Angas or figures

(b) For the upper-lines of the tables of all Angas or figures, sometimes, if carefully observed, Angas or figures of higher value should have to be written than

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the Anga or figure probable for the subtraction of two or more proxies of the same line or for the subtraction of the figure '1' of the extreme left, either independently or consecutively along with other proxies.

(c) Angas or figures should be written carefully observing the relevant rules and restrictions by subtracting the existing respective proxies.

6. (a) In all modes of permutation for answering Nashta of Akhanda-prastara, if either remainder or proxy or both are not existing, one or more inferior (least) Angas or figures should only be written to fill-in the deficit value of the prastara.

(b) In all modes of permutation for answering Nashta of Khanda-prastara, for all the tables of Angas or figures, except the tables of the lowest Angas or figures one or more lowest Angas or figures should be written for the lowest-lines and for the upper-lines, either the lowest Anga or figure or the Anga or figure of that particular table, or both, should be written anti-clockwise, in ascending order of value, irrespective of the number of Angas or figures to fill-in the deficit value of the prastara. While doing so the relevant rules and restrictions should be observed in writing the Angas or figures to fill-in the deficit value of the prastara.

(c) In Panchanga-prastara for answering Nashta of Khanda-prastara, for Druta-meru, which is the table of the inferior (lowest) Anga, one or more Laghus, Laghu being the next immediate higher Anga than Druta, should be written for the lowest-line as this is the line consisting of only DDPs (Druta-devoid-permutations). For the upper-lines, as Druta plays a dual role of both the lowest Anga of that mode and the Anga of that particular table as well, either Druta or Laghu or both should be written, in ascending order of value, irrespective of the number of the Angas, to fill-in the deficit value of the prastara.

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(d) In Shadanga-prastara for answering Nashta of Khanda-prastara, for Anudruta-meru, which is the table of the inferior (lowest) Anga of that mode, one or more Drutas, Druta being the next immediate higher Anga than Anudruta, should be written for the lowest-line, as this is the line consisting of only ADPs (Anudruta- devoid-permutations). For the upper-lines, as Anudruta plays a dual role of both the lowest Anga of that mode and the Anga of that particular table as well, either Anudruta or Druta or both, should be written, in ascending order of value, irrespective of the number of Angas, to fill-in the deficit value of the prastara. Besides, it should be well remembered that one or more Laghus also have to be written, if found necessary, for both the lowest and upper-lines of this table of Anudruta.

(e) In Samyuktanga-prastara for answering Nashta of Khanda-prastara, for the table of one-unit (Eka-anudruta-meru), which is the table of the lowest-unit of that mode and in which the houses of both 'Zero' and the proxy of the table concerned should together be accounted for writing the relevant Angas or figures, one or more Angas of 2-units, they being the immediate higher Angas than the Angas of 1-unit, should be written for the lowest-line, as this is the line consisting of only 1-UDPs (one-unit-devoid-permutations). For the upper-lines, as Anga of one-unit plays a dual role of both the lowest Anga of that mode and the Anga of that particular table as well, Angas of 1-unit or 2-units or both should be written, in ascending order of value, irrespective of the number of figures, to fill-in the deficit value of the prastara. Besides, it should be well remembered that one or more Angas of 3-units also have to be written, if found necessary, for the lowest and upper-lines of this table.

7. (a) In all modes of permutation in respect of the upper-lines of the table of any Anga or figure other than the lowest, if the process of subtraction continues

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upto the lowest-line, further Angas or figures should always be written as per the key-rules governing the lowest-line only.

(b) In all modes of permutation, for the upper-lines of the very first table of the lowest Anga or figure, if the process of subtraction continues upto the lowest-line and any figure of that line cannot be subtracted, one lowest Anga or figure should be written in the first instance and further Angas or figures be written later as per the key-rules governing the lowest-line only.

VERY-IMPORTANT-NOTE -: Subtract the question number of the prastara from the respective 'Sankhya' and add figure '1' to the remainder to obtain the corresponding serial-number from Anuloma-serial-number to Viloma-serial-number or vice-versa.

EXAMPLES

I. AKHANDA-PRASTARA

(a) ANULOMA-NASHTA :-

1. What are the series of Angas pertaining to the 1st prastara of 12-DP of Panchanga-prastara?

To write the 'Sankhya' of Panchanga-prastara, the total of the figures of the preceding 1st, 2nd, 4th, 6th and 8th houses, which are the fixed respective proxies of Panchanga-prastara, should always be written and now, as per rule No. 1 write the figures upto the required 12-DP (refer table-1).

Now as per rule No. 2 (a), subtract the question number '1', from the 'Sankhya' figure '632' of 12-DP as the question number belongs to the 12-DPs and the remainder (632-1) is '631'.

Now, from the above remainder '631', the respective proxies (the figures of the preceding 1st, 2nd, 4th, 6th and 8th houses i.e., first-1st proxy, second-2nd proxy, third-4th proxy, fourth-6th proxy and fifth-8th proxy of the figure '632', the 'Sankhya' of 12-DP)

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should consecutively be subtracted as this figure '632' is only the combination of all these five proxies. So, accordingly, from the above remainder '631', the first-1st proxy '350' (631-350=281), the second-2nd proxy '196' (281-196=85), the third-4th proxy '61' (86-61=24) and the fourth-6th proxy '19' (24-19=5) could consecutively be subtracted and as four proxies have consecutively been subtracted, as per rule No.4, write the fifth consecutive Anga (1st-Druta, 2nd-Laghu, 3rd-Guru, 4th-Pluta and 5th- Kakapada), Kakapada, in total, and leave away the fifth-8th proxy '6', (As this figure '6' could not consecutively be subtracted from the last remainder '5', being a figure bigger than the remainder, this figure '6' becomes the figure to be left-off, after obtaining the Anga, Kakapada).

Now, as per rule No.5 (a), we have to start the process of subtraction again from the beginning by consecutively deducting the respective preceding proxies of the above left-off proxy and accordingly, from the remainder '5', the first-1st proxy '3' (5-3=2) and the second-2nd proxy '2' (2-2=0) of the above left-off proxy '6', could consecutively be subtracted and as per rule No. 4, as two proxies have consecutively been subtracted, write the third consecutive Anga, Guru.

Till now we have obtained Kakapada and Guru. Now, as no remainder is left and as also the total value of Kakapada and Guru together is tallied with the value of 12-DP, the process of subtraction is over and thus the series of this 1st prastara of 12-DP consist of 'S+'.

2. What are the series of Angas pertaining to the 385th prastara of 12-DP?

Follow the rule No.1 as in the example-1.

Now, as per rule No.2 (a), the remainder (632-385) is '247'.

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Later, as per rule No. 3, as the first-1st proxy '350', being a figure bigger than the above remainder '247', could not be subtracted from the remainder, write Druta of the same first-1st proxy.

Now, as per rule No.5 (a), we have to start the process of subtraction again from the beginning by consecutively deducting the respective preceding proxies of the above un-deducted proxy and accordingly from the above remainder '247', the first-1st proxy '196' of the above un-deducted proxy '350' could only be subtracted (247-196=51) and as per rule No. 4, as only one proxy has been subtracted, write the second consecutive Anga, Laghu and leave away the second- 2nd proxy '108' of the above un-deducted proxy '350'. (Had '108' also been subtracted consecutlvejy along with '196', we would have got the third consecutive Anga, Guru, for the consecutive subtraction of two proxies, but, as '108' could not consecutively be subtracted, being a figure bigger than the last remainder '51', this '108, has become the figure to be left-off)

Now, again as per rule No. 5 (a), we have to start the process of subtraction again from the beginning by consecutively deducting the respective preceding proxies of the above last left-off proxy. But, accordingly, from the last remainder '51', as even the first-1st proxy '61' of the above left-off proxy '108' could not also be subtracted being a figure than the remainder, as per rule No. 3, write the Anga, Druta of the same first-1st proxy.

Now, again as per rule No. 5 (a), we have to start the process of subtraction from the beginning by consecutively deducting the respective preceding proxies of the above last un-deducted proxy and accordingly now, from the last remainder '51', the first-1st proxy '33' of the above un-deducted proxy '61', could be subtracted (51-33=18) and as per rule No. 4, as only one proxy could be subtracted, write the second

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consecutive Anga, Laghu and leave away the second-2nd proxy '19' of the above un-deducted proxy '61'.

Now, again as per rule No. 5 (a), we have to start the process of subtraction again from the beginning by consecutively deducting the respective preceding proxies of the above last left-off proxy, and accordingly now, from the last remainder '18', the first-1st proxy '10' (18-10=8), the second-2nd proxy '6' (8-6=2) and the third-4th proxy '2' (2-2=0) of the above left-off proxy '19', could consecutively be subtracted and as per rule No. 4, as three proxies have consecutively been subtracted, write the fourth consecutive Anga, Pluta. Till now, we have obtained Druta, Laghu, Druta, Laghu and Pluta consecutively. Now, as no remainder is left and as also the total value of all these above Angas together is tallied with the value of 12-DP, now the process of subtraction is over and the series of this 385th prastara of 12-DP consist of

I
'SIOIO'.

3. What are the series of Angas pertaining to the 318th prastara of 11-AP of Trisra-jati of Shadanga-prastara?

To write the 'Sankhya' of Trisra-jati of Shadanga-prastara the total of the 1st, 2nd, 3rd, 6th, 9th and 12th proxies should be written and as per rule No. 1 write the figures upto the required permutation (refer tabie-8).

As per rule No. 2 (a) the remainder (565-318) is '247'.

From this remainder '247', the first-1st proxy '302' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the first proxy.

As per rule No. 5 (a), from the above remainder '247', the first-1st proxy '162' of the above un-deducted proxy '302', could only be subtracted (247-162=

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85) and as per rule No. 4 write the second consecutive Anga, Druta, leaving away the second-2nd proxy '86'.

Now, again as per rule No. 5 (a), from the last remainder '85', the first-1st proxy '46' (85-46=39), the second-2nd proxy '25' (39-25=14) and the third-3rd proxy '13' (14-13=1) of the above left-off proxy '86', could consecutively be subtracted and as per rule No. 4, write the fourth consecutive Anga, Guru, leaving away the fourth-6th proxy '2'.

Again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above left-off proxy '2', could be subtracted (1-1=0) and as per rule No. 4 write the second consecutive Anga, Druta. Thus the series of this prastara consist of 'O S O U'.

4. What are the series of Angas pertaining to 148th prastara of 12-AP of Chaturashra-jati of Shadanga-prastara?

To write the 'Sankhya' of Chaturashra-Jati of Shadanga-prastara the total of the 1st, 2nd, 4th, 8th, 12th and 16th proxies should be written and as per rule No. 1 write the figures upto the required permutation (refer table-16).

As per rule No. 2 (a) the remainder (543-148) is '395'.

From this above remainder the first-1st proxy '306' (395-306=89) could only be subtracted and as per rule No. 4 write the second consecutive Anga, Druta, leaving away the second-2nd proxy '174'. Later, as per rule No. 5 (a), from the last remainder '89' the first-1st proxy '98' of the left-off proxy '174', could not be subtracted and as per ruie No. 3 write the Anga, Anudruta of the first proxy.

Now, again as per rule No. 5 (a), from the above remainder '89', the first-1st proxy '56' (89-56=33) and the second - 2nd proxy '31' (33–31=2) of the above un-deducted proxy '98', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, leaving away the third-3rd proxy '10'.

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Later, again as per rule No. 5 (a), from the last remainder '2', the first - 1st proxy '6' of the above left-off proxy '10' and again the first - 1st proxy '3' of the previously un-deducted proxy '6', thus two first - 1st proxies could not consecutively be subtracted and as per rule No. 3 write two Angas, Anudrutas of the first proxy consecutively.

Now, as per rule No. 5 (a), from the remainder '2', the first - 1st proxy '2' of the above last un-deducted proxy '3', could be subtracted (2-2=0) and as per rule No. 4 write the second consecutive Anga, Druta. Till now, three Anudrutas, two Drutas, and one Laghu are obitained, whose total value amounts to '11-units' and this is one-unit lesser than the value of 12-AP which is of '12 - units'. So, as per rule No. 6 (a) to fill-in the deficit value of the above one - unit write one more inferior (lowest) Anga, Anudruta.

Thus the series of this prastara consist of 'U O U U I U O'.

5. What are the series of Angas pertaining to the 170th prastara of 12-AP of Khanda-jati of Shadanga-prastara?

The respective proxies of Khanda-jati of Shadanga-prastara are the 1st, 2nd, 5th, 10th, 15th and 20th proxies and as per rule No. 1 write the figure of 'Sankhya' upto the required permutation basing upon the above proxies (refer table-23).

As per rule No. 2 (a) the remainder (377-170) is '207'.

From the above remainder the first-1st proxy '220' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the first-proxy.

Later, as per rule No. 5 (a), from the remainder '207', the first-1st proxy '129' (207-129=78) and the second-2nd proxy '75' (78-75=3) of the above un-de-

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ducted proxy '220', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, leaving away the third - 5th proxy '15'.

Now, as per rule No. 5 (a), from the remainder '3', the first-1st proxy '9' of the above left-off proxy '15', could not be subtracted and again the first-1st proxy '5' of the previously un-deducted proxy '9' i, e., two first-1st proxies '9' & 5' of the above left-off proxy '15' and un-deducted proxy '9', could not consecutively be subtracted and as per rule No. 3 write two Angas, Anudrutas of the first proxy consecutively.

Later, again as per rule No. 5 (a), from the remainder '3', the first-1st proxy '3' of the above last un-deducted proxy '5', could be subtracted (3–3=0) and as per rule No. 4 write the second consecutive Anga, Druta.

Now, as per rule No. 6 (a), to fill-in the deficit value of the prastara write two more inferior Angas, Anudrutas.

Thus the series of this prastara consist of 'U U O U U I U'.

6. What are the series of Angas pertaining to the 113 th prastara of 12-AP of Mishra-jati of Shadanga-prastara ?

The respective proxies of Mishra-jati of Shadanga-prastara are the 1st, 2nd, 7th, 14th, 21st and 28th representing Anudruta, Druta, Laghu, Guru, Pluta and Kakapada respectively and as per rule No. 1 write the figures of 'Sankhya' upto the required permutation basing upon the above proxies (refer table-29).

As per rule No. 2 (a) the remainder (271-113) is '158'.

From the above remainder the first-1st proxy '164' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the first proxy.

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Now, as per rule No. 5 (a), from the above remainder, the first-1st proxy '99' of the above un-deducted proxy '164', could be subtracted (158-99=59) and as per rule No. 4 write the second consecutive Anga, Druta, leaving away the second-2nd proxy '60'.

Later, again as per rule No. 5 (a), from the last remainder '59', the first-1st proxy '36' (59-36=23) and the second-2nd proxy '22' (23-22=1) of the above left-off proxy '60', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, leaving away the third-7th proxy '2'.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above left-off proxy '2', could be subtracted (1–1 = 0) and as per rule No. 4 write the second consecutive Anga, Druta.

Thus the series of this prastara consist of '0 I O U'.

7. What are the series of Angas pertaining to the 2nd prastara of 12-AP of Sankeerna-jati of Shadanga-prastara ?

The respective proxies of Sankeerna-jati of Shadanga-prastara are the 1st, 2nd, 9th, 18th, 27th and 36th which represent the Anudruta, Druta, Laghu, Guru, Pluta, and Kakapada respectively and as per rule No. 1 write the figures of 'Sankhya' upto the required permutation basing upon the above proxies (refer table-34).

As per rule No. 2 (a) remainder (243-2) is '241'.

From this above remainder the first-1st proxy '149' (241-149=92) and the second-2nd proxy '91' (92-91=1) could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, leaving away the third-9th proxy '3'.

Now, as per rule No. 5 (a), from the remainder '1', the first-1st proxy '2' of the above left-off proxy

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'3', could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the first proxy.

Later, again as per rule No. 5 (a), from the remainder '1', the first-1st proxy '1' of the above un-deducted proxy '2', could be subtracted (1–1=0) and as per rule No. 4 write the second consecutive Anga, Druta. Thus the series of this prastara consist of 'O U I'.

8. What are the series of figures pertaining to the 67th prastara of 8-UP of Samyuktanga-prastara ?

The respective proxies of Samyuktanga-prastara are the figures of all the preceding houses and as per rule No. 1 write the figures of 'Sankhya' upto the required units of permutation basing upon all the preceding proxies (refer table-39).

As per rule No. 2 (a) the remainder (128-67) is is '61'.

From this above remainder the 1st proxy '64' could not be subtracted and as per rule No. 3 write the Anga of one-unit or figure '1' of the 1st proxy.

Now, as per rule No. 5 (a), from the remainder '61', the 1st proxy '32' (61-32=29), the 2nd proxy '16' (29-16=13), the 3rd proxy '8' (13-8=5) and the 4th proxy '4' (5-4=1) of the above un-deducted proxy '64' could consecutively be subtracted and as per rule No. 4 write the fifth consecutive Anga consisting of five units or figure '5' leaving away the 5th proxy '2'.

Later, as per rule No. 5 (a), from the remainder '1', the 1st proxy '1' of the above left-off proxy '2', could be subtracted (1–1=0) and as per rule No. 4 write the second consecutive Anga consisting of two-units or figure '2'.

Thus the series of unit-values of this prastara are '2 5 1'.

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(b) Viloma-nashta :-

9. What are the series of Angas pertaining to the 632nd prastara of 12-DP of Panchanga-prastara?

As per rule No. 1 write Sankhya upto the required 12-DP (refer question-1). Now, as per rule No. 2 (b) subtract figure '1' from the question number '632' (632-1) and the remainder is '631'. Later follow as in Anuloma-nastha. The same method should be followed for all the remaining Jatis and modes of permutation.

(c) Madhyarupa-nashta :-

(i) Uparisthita- nashta :-

10. What are the the series of Angas of the 6th Viloma-prastara of 6-DP from the prastara of the 'Mid-most-number (MN)'?

As per rule No. 1 write down 'Sankhya' upto the required 6-DP (refer question-1).

As 'Sankhya' of 6-DP is of odd-number '19' the prastara of the 'midmost-number (MN)' is Anuloma-10. As per rule No. 2 (c) (i) the Viloma-serial-number '6' should be added to MN '10' (10+6=16) and for odd-number of 'Sankhya' figure '1' should also be subtracted from the above total '16' (16-1=15).

The above remainder '15' is the 'superior-Angas'-figure (SF)' and as per rules of Nashta this SF '15' gives out the series 'S I' of 6-DP and this is the answer.

11. What are the series of Angas of the 2nd viloma-prastara of 5-DP from the MN?

As per rule No. 1 write down 'Sankhya' upto the required 5-DP (refer question-1).

As 'Sankhya' of 5-DP is of even number '10' the MN is Anuloma-5.

As per rule No.2 (c) (i) the question-number '2' should be added to the MN '5' (2+5=7).

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The above total '7' is the SF and as per Nashta this figure gives out the series '101' of 5-DP and this is the answer.

(ii) Athasthita-nashta :-

12. What are the series of 8th Anuloma-prastara of 6-DP from the MN?

As per rule No. 1 write down 'Sankhya' upto the required 6-DP (refer question-1).

As 'Sankhya' of 6-DP is of odd-number '19, the MN is Anuloma-10.

As per rule No. 2 (c) (ii) the question-number '8' should be subtracted from the MN '10' (10-8=2) and for 'Sankhya' of odd-number further subtract figure '1' also from the above remainder (2-1=1). This remainder '1' is the SF and as per Nashta this figure gives out the series '10000' of 6-DP and this is the answer.

13. What are the series of the 4th Anuloma-prastara of 5-DP from the MN?

As per rule No. 1 write down 'Sankhya' upto the required 5-DP (refer question-1).

As 'Sankhya' of 5-DP is of even-number '10' the MN is Anuloma-5.

As per rule No. 2 (c) (ii) the question number '4' should be subtracted from the MN '5' (5-4=1).

The above remainder '1' is the SF and as per Nashta this figure gives out the series '10000' of 5-DP and this is the aeswer.

In the above manner the questions of Akhanda-nashta of all Jatis should be answered.

II. KHANDA-PRASTARA

(a) Anuloma-nashta :-

1. What are the series of Angas pertaining to the 12th DDP of 12-DP?

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To write the figures of 'Sankhya' of Panchanga-prastara the total of the 1st, 2nd, 4th, 6th and 8th proxies should be written and for the lowest - line of Druta-meru the total of the above proxies, except the 1st proxy, it being the lowest devoid line of the first table of Druta, sheuld be written. Now, as per lern No. 1 write the figures of 'Sankhya' upto the required permutation (refer table-2).

As per rule No.2 (a) the remainder (29-12) is '17'.

From the above remainder, the second-2nd proxy '15' could be subtracted (17-15=2) and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '8'.

Now, as per rule No.5 (a), from the last remainder '2', the second-2nd proxy '4' of the above left-off proxy '8', could not be subtracted and as per rule No.3 write the second consecutive Anga, Laghu.

Now, again as per rule No. 5 (a), from the last remainder '2', the second-2nd proxy '2' of the above un-deducted proxy '4', could be subtracted (2–2=0) and as per rule No. 4 write the third consecutive Anga, Guru.

Later, as per rule No. 6 (c), to fill-in the deficit value of the prastara and to make it Druta-devoid-permutation (DDP) write one Laghu and thus the series of this prastara consist of "ISIS".

2 What are the series of Angas pertain:ng to the 16th DDP of 12-DP?

Follow the rule No. 1 as in example-1.

As per rule No. 2 (a) the remainder (29-16) is '13'.

From the above remainder the second-2nd proxy '15' could not be subtracted and as per rule No. 3 write the second consecutive Anga, Laghu,

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Now, as per rule No. 5 (a), from the above remainder '13', the second-2nd proxy '8' (13-8=5) and the third-4th proxy '4' (5-4=1) of the above un-deducted proxy '15' could consecutively be subtracted and as per rule No. 4 write the fourth consecutive Anga, Pluta, leaving away the fourth-6th proxy '2'.

Later, again as per rule No. 5 (a), from the last remainder '1', the second-2nd proxy '1' of the above left-off proxy '2', could be subtracted (1–1=0) and as per rule No. 4 write the third consecutive Anga, Guru.

Thus the series of this prastara consist of 'S Ṡ I'.

3. What are the series of Angas pertaining to the 2nd 2-DCP of 8-DP? The total of all the proxies of Panchanga-prastara but the first-1st proxy from the immediate lower line, it being the first table of Druta should be written for the upper-lines of Druta-meru and now as per rule No. 1 write 'Sankhya' upto the required permutation (refer table-2).

As pet rule No. 2 (a) the remainder (25-2) is '23'.

From the above remainder the lower first-1st proxy '12' (23–12=11) and the second-2nd proxy '9' (11–9=2) could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '3'.

Now, as per rule No. 5 (a), from the last remainder '2', the lower first-1st proxy '2' of the above left-off proxy '3', could only be subtracted (2–2=0) and as per rule No. 4 write the second consecutive Anga, Laghu.

Later, as per rule No. 6 (c), to fill-in the deficit value of the prastara and to make it 2-DCP, two inferior Angas, Drutas should be written.

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Thus the series of this prastara consist of '0 0 I S' (refer the permuted examples furnished at the end of of this book).

4. What are the series of Angas pertaining to the 3rd 2-DCP of 8–DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-3) is '22'.

From the above remainder the lower first-1st proxy '12' (22-12=10) and the second-2nd proxy '9' (10-9=1) could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '3'.

Later, as per rule No. 5 (a), from the last remainder '1', the lower first-1st proxy '2' of the above left-off proxy '3' could not be subtracted and as per rule No. 3 write the first Anga, Druta.

Now, again as per rule No. 5 (a), from the last remainder '1', the lower first-1st proxy '1' of the above un-deducted proxy '2', could be subtracted and as per rule No. 4 write the second consecutive Anga, Laghu,

Later, as per rule No. 6 (c), to fill-in the deficit value of the prastara and to make it 2-DCP write one Druta and thus the series of this prastara consist of 'O I O S'.

5. What are the series of Angas pertaining to the 5th 2-DCP of 8-DP?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (23–5) is '20'.

From the above remainder the lower first–1st proxy '12' could be subtracted (20-12=8) and as per rule

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No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '9'.

Later, as per rule No. 5 (a), from the last remainder '8', the lower first-1st proxy '5' (8–5=3) and the second-2nd proxy '3' (3–3=0) of the above left-off proxy '9', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru.

As per rule No. 6 (c), to fill-in the deficit value of the prastara and also to make it 2-DCP write two inferior Angas, Drutas.

Thus the series of this prastara consist of '0 0 S I'.

6. What are the series of Angas pertaining to the 9th 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-9) is '16'.

From the above remainder the lower first-1st proxy '12' could be subtracted (16–12=4) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '9'.

Now, as per rule No.5 (a), from the last remainder '4', the lower first-1st proxy '5' of the above left-off proxy '9', could not be subtracted and as per rule No. 3 write the Anga of the 1st proxy, Druta.

Now, again as per rule No. 5 (a), from the last remainder '4', the lowest first-1st proxy '2' (4–2=2) and the second-2nd proxy '2' (2–2=0) of the above un-deducted proxy '5', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru.

As per rule No. 6 (c), and also to make it 2-DCP write an inferior Anga, Druta and thus the series of this prastara consist of 'O S O I'.

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7. What are the series of Angas pertaining to the 12th 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-12) is '13'.

From the above reminder the lower first-1st proxy '12' could be subtracted (13-12=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '9'.

Now, as per rule No. 5 (a), from the last remainder '1', the first -1st proxy '5' of the above left-off proxy '9' could not be subtracted and also again the first-1st proxy '2' of the previously un-deducted proxy '5'could not be subtracted and as per rules Nos. 3&7 (b) write two inferior Angas, Drutas of the 1st proxy.

Now, as per rules Nos. 5 (a) and 7 (b), from the last remainder '1', the second-2nd proxy '1' of the above last un-deducted proxy '2' of the lowest-line, could be subtracted (1-1=0) and as per rule No.4 write the third consecutive Anga, Guru.

Thus the series of this prastara consist of 'S 0 0 I'.

8. What are the series of Angas pertaining to the 15th 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-15) is '10'.

From this above remainder the lower first-1st proxy '12' could not be subtracted and as per rule No. 3 write the Anga of the 1st proxy, Druta.

Now, as per rule No. 5 (a), from the above remainder '10', the lowest first-1st proxy '4' (10-4=6) and the second-2nd proxy '5' (6-5=1) of the above un-deducted proxy '12', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '2'.

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Later, again as per rule No. 5 (a), from the last remainder '1' the lowest first-1st proxy'1' of the above left-off proxy '2', could be subtracted (1-1=0) and as per rule No. 4 write the second consecutive Anga, Laghu.

As per rule No. 6 (c) and also to make it 2-DCP write an inferior Anga, Druta and thus the series of this prastara consist of 'O I S O,

9. What are the series of Angas pertaining to the 17th 2- DCP of 8-DP ?

Follow the rule No. 1 as in example-3.
As per rule No. 2 (a) the remainder (25-17) is '8'.

From the above remainder the lower first-1st proxy, '12' could not be subtracted and as per rule No. 3 write the Anga of the 1st proxy, Druta.

Now, as per rule No. 5 (a), from the above remainder '8', the lowest first-1st proxy '4' of the above un-ducted proxy '12', could be subtracted (8-4=4) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

Later, again as per rule No. 5 (a), from the last remainder '4', the lowest first-1st proxy '2' (4-2=2) and the second-2nd proxy '2' (2-2=0) of the above left-off proxy '5', could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru.

Now, as per rule No. 6 (c) and also to make it 2-DCP write an inferior Anga, Druta and thus the series of this prastara consist of 'OSIO'.

10. What are the series of Angas pertaining to the 18th 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-18) is '7'.

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From the above remainder the lower first-1st proxy '12' could not be subtracted and as per rule No. 3 write Anga of the 1st proxy, Druta.

Now, as per rule No. 5 (a), from the above remainder '7', the lowest first-1st proxy '4' of the un-deducted proxy '12', could be subtracted (7-4=3) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

Later, again as per rule No. 5 (a), from the last remainder '3', the lowest first-1st proxy '2' of the above left-off proxy '5', could be subtracted (3-2=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '2',

Now, again as per rule No. 5 (a), from the last remainder '1', the lowest first-1st proxy '1' of the above left-off proxy '2', could be subtracted (1-1=0) and again as per rule No. 4 write the second consecutive Anga, Laghu.

Later, as per rule No. 6 (c) and also to make it 2-DCP write an inferior Anga, Druta and thus the series of this pratara consist of '01110'.

11. What are the series of Angas pertaining to the 20th 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As perrule No. 2 (a) the remainder (25-20) is '5'.

From the above remainder the lower first-1st proxy '12' could not be subtracted and as per rule No. 3 write the Anga of the first-1st proxy, Druta.

Later, as per rule No. 5 (a), from the above remainder '5', the lowest first-1st proxy '4' of the above un-deducted proxy '12', could be subtracted (5—4=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

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Now, again as per rule No. 5 (a), from the last remainder '1', the lowest first-1st proxy '2' of the above left-off proxy '5', could not be subtracted and as per rules Nos. 4 & 7 (b) write the Anga of the 1st proxy, Druta.

Later, as per rules Nos. 5 (a) and 7 (b), from the last remainder '1', the lowest second-2nd proxy '1' of the above un-deducted lowest proxy '2', could be subtracted and as per rule No. 4 write the third consecutive Anga, Guru.

Thus the series of this prastara consist of 'SOIO'.

12. What are the series of Angas pertaining to the 23rd 2-DCP of 8-DP ?

Follow the rule No. 1 as in example-3.

As per rule No. 2 (a) the remainder (25-23) is '2'.

From the above remainder the lower first-1st proxy '12' and its lowest first-1st proxy '4' could not consecutively be subtracted and as per rules Nos. 3 and 7 (b) write two Angas of the 1st proxy, Drutas.

Later, as per rules Nos. 5 (a) and 7 (b), from the above remainder '2', the lowest second-2nd proxy '2' of the above un-deducted last proxy '4' could be subtracted (2—2=0) and as per rule No. 4 write the third consecutive Anga, Guru.

Now, as per rule No. 6 (c) to fill-in the deficit value of the prastara write the inferior Anga, Laghu, of the lowest line.

Thus the series of this prastara consist of 'I S O O'.

13. What are the series of Angas pertaining to the 24th 2–DCP of 8-DP ?

Follow the rule No. 1 as inexample–3.

As per rule No. 2(a) the remainder (25-24) is '1',

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From the above remainder the lower first–1st proxy '12' and its lowest first-1st proxy '4' could not consecutively be subtracted and as per rules Nos. 3, 6 (c) and 7 (b) write two Angas, Drutas of the 1st proxy.

Later, as per rule No. 5 (a) and 7 (b), from the above remainder '1', the lowest second-2nd proxy '2' of the above un-deducted last proxy '4', could not be subtracted again and as per rule No. 4 write the Anga, Laghu of the same second-2nd proxy of the lowest line.

Now, again as per rule No. 5 (a) and 7 (b), from the above remainder '1', the second-2nd proxy '1' of the above un-deducted lowest proxy '2', could, now, be subtracted (1–1=0) and as per rule No. 4 write the third consecutive Anga, Guru,

Thus the series of this prastara consist ot 'S I O O'.

14. What are the series of Angas pertaining to the 2nd LDP of 10-DP?

To write the figures of 'Sankhya' for the lowest line of Laghu-meru, the total of all the proxies of Panchanga-prastara, except the second 2nd proxy, it being the lowest devoid line of the second table of Laghu, should be written and now, as per rule No. 1 write the same upto the required permutation (refer table -3).

As per rule No. 2 (a) the remainder (24-2) is '22'.

From the above remainder the first-1st proxy '16' (22-16=6) and the third-4th proxy '5' (6-5=1) could consecutively be subtracted and as per rule No. 4 write the fourth consecutive Anga, Pluta, leaving away the fourth-6th proxy '2'.

Now, as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above left-off proxy '2', could be subtracted (1–1=0) and as per rule No, 4 write the third consecutive Anga, Guru.

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Thus the series of this prastara consist of 'S S'.

15. What are the series of Angas pertaining to the 7th LDP of 10-DP?

Follow the rule No.1 as in example-14

As per rule No. 2 (a) the remainder (24–7) is '17'.

From the above remainder the first-1st proxy '16' could be subtracted (17–16=1) and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '5'.

Now, as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '3' and its first-1st proxy '2' of the above left-off proxy '5', could not consecutively be subtracted and as per rule No. 3 write two Angas, Drutas of the 1st proxy.

Later, again as per rule No. 5 (a), from the above remainder '1', the first-1st proxy '1' of the above last un-deducted proxy '2', could be subtracted (1–1=0) and as per rule No. 4 write the third consecutive Anga, Guru.

Thus the series of this prastara consist of 'S O O S'.

16. What are the series of Angas pertaining to the 3rd 1-LCP of 8-DP?

To write the 'Sankhya' for the upper-lines of Laghu-meru, the total of all the proxies of Panchanga-prastara but the second-2nd proxy, it being the second table of Laghu, from the immediate lower line, should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-3).

As per rule No. 2 (a) the remainder (21-3) is '18',

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From the above remainder the first-1st proxy '12' (18—12=6) and the lowest second-2nd proxy '5' (6—5=1) could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the third-4th proxy '3'.

Later, as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '3', could not be subtracted and as per rule No. 3 write the Anga of the 1st proxy which is Druta.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above undeducted proxy '2', could be subtracted (1—1=0) and as per rule No. 4 write the second consecutive Anga, Laghu.

Later, as per rule No. 6 (b) to fill-in the deficit value of the prastara write an inferior Anga, Druta.

Thus the series of this prastara consist of 'OIOS' (refer the permuted examples furnished at the end of this book).

17. What are the series of Angas pertaining to the 8th 1-LCP of 8-DP?

Follow the rule No. 1 as in example-16.

As per rule No. 2 (a) the remainder (21-8) is '13'.

From the above remainder the first-1st proxy '12' could be subtracted (13—12=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the lowest second-2nd proxy '5'.

Now, as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '3' and again its first-1st proxy '2' of the above left-off proxy '5', could not consecutively be subtracted and as per rule No. 3 write two Angas, Drutas of the 1st proxy.

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Later, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above un-deducted last proxy '2', could be subtracted (1—1=0) and as per rules Nos. 4 & 7 (a) write the Anga, Guru of the third consecutive proxy, as the second consecutive Anga, Laghu should not be written, being the lowest devoid line of Laghu-meru.

Thus the series of this prastara consist of 'SOOI'.

18. What are the series of Angas pertaining to the 13th 1-LCP of 8-DP?

Follow the rule No. 1 as in example-16.

As per rule No. 2 (a) the remainder (21-13) is '8'.

From the above remainder the first-1st proxy '12' could not be subtracted and as per rule No. 3 write the Anga, Druta of the 1st proxy.

Later, as per rule No. 5 (a), from the above remainder '8', the first-1st proxy '7' of the above un-deducted proxy '12', could be subtracted (8—7=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the lowest second-2nd proxy '3'.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '3', could not be subtracted and as per rule No. 3 write the Anga, Druta of the 1st proxy.

Later, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the un-deducted proxy '2', could be subtracted (1–1=0) and as per rules Nos. 4 & 7 (a) write the third consecutive Anga, Guru, as the second consecutive Anga, Laghu, should not be written, being the lowest devoid line of Laghu.

Thus the series of this prastara consist of 'S O I '0'.

19. What are the series of Angas pertaining to the 18th 1-LCP of 8-DP?

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Follow the rule No. 1 as in example-16.

As per rule No. 2(a) the remainder (21-18) is '3'.

From the above remainder the first-1st proxy '12', its first-1st proxy '7' and again its first-1st proxy '4' thus three first-1st proxies could not consecutively be subtracted and as per rule No. 3 write three Angas, Drutas of the 1st proxy.

Later, as per rule No. 5[a], from the above remainder '3', the first-1st proxy '3' of the above un-deducted last proxy '4', could be subtracted and as per rule No. 4 write the second consecutive Anga, Laghu.

Now, as per rules No. 6 [b], to fill-in the deficit value of the prastara write three inferior Angas, Drutas.

Thus the series of this prastara consist of '0 0 0 1 0 0 0'.

20. What are the series of Angas pertaining to the 4th 1-GCP of 8-DP?

To write the figures of 'Sankhya' for the upper-lines of Guru-meru, the total of all the proxies of Pan-changa-prastara, but the third-4th proxy, being the third table of Guru, of the immediate lower line, should be written and now, as per rule No. 1 write the same up to the required permutation [refer table–4].

As per rule No. 2 [a] the remainder [20–4] is '16'.

From the above remainder the first-1st proxy '10' [16–10=6] and the second-2nd proxy '5' [6–5=1] could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Guru, leaving away the lowest third-4th proxy '5'.

Now, as per rule No. 5(a), from the last remainder '1', the first-1st proxy '3' and again its first-1st proxy '2' of the above left-off proxy '5' could not consecutively be subtracted and as per rule No. 3 write two Angas, Drutas of the 1st proxy.

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Later, again as per rule No.5 (a), from the last remainder '1', the first-1st proxy '1' of the above undeducted last proxy '2' could be subtracted and as per rule No. 4 write the second consecutive Anga, Laghu.

Thus the series of this prastara consist of 'I O O S'.

21. What are the series of Angas pertaining to the 9th 1-GCP of 8 DP ?

Follow the rule No. 1 as in example–20.

As per rule No.2 (a) the remainder [20-9] is '11'.

From the above remainder, the first-1st proxy '10' could be subtracted and as per rule No. 4, write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

Now, as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '5', could not be subtracted and as per rule No. 3 write the Anga, Druta of the 1st proxy.

Later, again as per rule No. 5 [a], from the last remainder '1', the first–1st proxy '1' of the above undeducted proxy '2' could, now, be subtracted and as per rules Nos. 4, 5 [b] & [c] write Guru as it should be 1-GCP.

Now, as per rule No. 6 [b] write one Druta and thus the series of this prastara consist of 'O S O I'.

22. What are the series of Angas pertaining to the 5th 1-PCP of 10-DP ?

To write the figures of 'Sankhya' for the upper-lines of Pluta-meru, the total of all the proxies of Panchanga-prastara but the fourth-6th proxy, being the fourth table of Pluta, of the immediate lower line, should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-5).

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As per rule No. 2 [a] the remainder [22-5] is '17'.

From the above remainder, the first-1st proxy '10' [17—10=7], the second-2nd proxy '5' [7—5=2], and the third-4th proxy '1' [2—1=1], could consecutively be subtracted and as per rule No. 4 write the fourth consecutive Anga, Pluta, leaving away the lowest fourth-6th proxy '6'. Later, as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '3' and again its first-1st proxy '2' of the above left-off proxy '6' could not consecutively be subtracted and as per rule No. 3 write two Angas, Drutas of the 1st proxy.

Now, again as per rule No. 5 [a], from the last remainder '1', the first - 1st proxy '1', of the above undeducted last proxy '2', could be subtracted [1—1=0] and as per rule No. 4 write the second consecutive Anga, Laghu.

Thus the series of this prastara consist of 'I O Ś O'.

23. What are the series of Angas pertaining to the 11th 1–PCP of 10–DP?

Follow the rule No. 1 as in example-22.

As per rule No. 2 (a) the remainder (22–11) is '11'.

From the above remainder the first-1st proxy '10' could be subtracted (11–10=1) and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

Now, as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '5' could not be subtracted and as per rule No. 3 write the Anga, Druta of the 1st proxy.

Later, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above undeducted proxy '2', could be subtracted (1–1=0) and as per rules Nos. 4, 5 (b) & (c) write Pluta as it should be 1–PCP.

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Later, as per rule No. 6 [b] to fill-in the deficit value of the prastara write one Druta and thus the series of this prastara consist of 'O S' O I'.

24. What are the series of Angas pertaining to the 5th 1–KCP of 12–DP?

To write the figures of 'Sankhya' for the upper-lines of Kakapada-meru, the total of all the proxies of Panchanga-prastara but the fifth-8th proxy, being the fifth table of Kakapada, of the immediate lower line, should be written and now, as per rule No. 1 write the same upto the required permutation [refer table-6].

As per rule No.2 [a] the remainder [22–5] is '17'.

From the above remainder the first-1st proxy '10' [17–10=7], the second-2nd proxy '5' [7-5=2] and the third-4th proxy '1' (2–1=1), could consecutively be subtracted and as per rules Nos.4, 5 (b) & (c) write Kakapada as it should be a 1–KCP and leave away the lowest fifth-8th proxy '6'.

Later, as per rule No.5 (a), from the last remainder '1', the first-1st proxy '3' and again its first-1st proxy '2' of the above left-off proxy '6' could not consecutively be subtracted and as per rule No. 3 write two Angas, Drutas of the 1st proxy.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above undeducted last proxy '2', could be subtracted (1–1=0) and as per rule No. 4 write the second consecutive Anga, Laghu.

Thus the series of this prastara consist of 'I 0 0 +'.

25. What are the series of Angas pertaining to the 11th 1-KCP of 12-DP?

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Follow the rule No. 1 as in example-24.

As per rule No. 2 (a) the remainder (22–11) is '11'.

From the above remainder the first-1st proxy '10' could be subtracted [11-10=1] and as per rule No. 4 write the second consecutive Anga, Laghu, leaving away the second-2nd proxy '5'.

Later, as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '5' could not be subtracted and as per rule No. 3 write the Anga, Druta of the 1st proxy.

Now, again as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '1' of the above un-deducted proxy '1' could be subtracted [1–1=0] and as per rule No. 5 [b] & [c] write Kakapada as it should be a 1-KCP.

Later, as per rule No. 6 [b] to fill-in the deficit value of the prastara write one Druta.

Thus the series of this prastara consist of '0 + 0 I'.

26. What are the series of Angas pertaining to the 17th 1-GCP of 10-AP of Trisra-jati ?

To write 'Sankhya' for the upper-lines of Guru-meru pertaining to Trisra-Jati of Shadanga-prastara, the total of all the 1st, 2nd, 3rd, 9th and 12th proxies but the fourth-6th proxy, being the fourth table of Guru, of the immediate lower-line should be written and now, as per rule No. 1 write the figures upto the required permutation (refer table-12).

As per rule No. 2 (a) the remainder (26-17) is '9'.

From the above remainder, the first-1st proxy '12' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

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Later, as per rule No. 5 (a), from the above remainder '9', the first-1st proxy '5' [9—5=4], the second-2nd proxy '2' [4—2=2] and the third-3rd proxy '1' [2—1=1] of the above un-deducted proxy '12', could consecutively be subtracted and as per rules Nos. 4 & 5 [b] write the fourth consecutive Anga, Guru, leaving away the lowest fourth-6th proxy '4'.

Now, as per rules Nos. 7[a] and 5 [a], from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '4', could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

Later as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '1' of the above un-deducted proxy '2' could be subtracted and as per rule No. 4 write the second consecutive Anga, Druta.

Thus the series of this prastara consist of 'O U S U'.

27. What are the series of Angas pertaining to the 16th 1-LCP of 8-AP of Chaturashra-jati?

To write 'Sankhya' for the upper-lines of Laghu-meru pertaining to Chaturashra-jati of Shadanga-prastara, the total of all the 1st, 2nd, 8th, 12th and 16th proxies but the third-4th proxy, being the third table of Laghu, of the immediate lower line, should be written and now, as per rule No. 1 write the same upto the required permutation [refer table-19].

As per rule No. 2 [a] the remainder [20-16] is '4'.

From the above remainder the first-1st proxy '10' and again its first-1st proxy '5' could not consecutively be subtracted and as per rule No. 3 write two Angas. Anudrutas of the 1st proxy.

Later, as per rule No. 5 [a], from the above remainder '4', the first-1st proxy '2' [4—2=2] and the second-2nd proxy '1' [2—1=1] of the above un-deducted last

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proxy '5', could consecutively be subtracted and as per rule No. 4, write the third consecutive Anga, Laghu, leaving away the lowest third-4th proxy '2'.

Now, as per rules Nos. 7 [a] & 5 [a], from the last remainder '1', the first-1st proxy '1' of the above left-off proxy '2' could be subtracten [1—1=0] and as per rule No. 4 write the second consecutive Anga, Druta.

Thus the series of this prastara consist of 'OIUU'.

28. What are the series of Angas pertaining to the 8th 1-DCP of 10-AP of Khanda-jati ?

To write 'Sankhya' for the upper-lines of Druta-meru of Khanda-jati of Shadanga-prastara, the total of all the 1st, 5th, 10th, 15th and 20th proxies but the second-2nd proxy, being the second table of Druta, of the immediate lower-line should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-25).

As per rule No. 2 (a) the remainder (29-8) is '21'.

From the above remainder the first-1st proxy '20' could be subtracted (21—20=1) and as per rule No. 4 write the second consecutive Anga, Druta, leaving away the lowest second-2nd proxy '5'.

Now, as per rules Nos. 7 (a) & 5 (a), from the last remainder '1', the first-1st proxy '4' of the above left-off proxy '5', its first-1st proxy '3' and again its first-1st proxy '2', thus three first-1st proxies, could not consecutively be subtracted and as per rule No. 3 write three Angas, Anudrutas of the 1st proxy.

Later, as per rules Nos. 5 (a) & 7 (a), from the last remainder '1', the first-1st proxy '1' of the above un-deducted last proxy '2' could be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, as in this table of Druta the Druta and its 2nd proxy are omitted for the lowest–line being the line of DDPs.

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Thus the series of this prastara consist of 'I U U U O'.

29. What are the series of Angas pertaining to the 11th 1-DCP of 12-AP of Mishra-jati ?

To write 'Sankhya' for the upper-lines of Druta-meru of Mishra-jati of Shadanga-prastara, the total of all the 1st, 7th, 14th, 21st and 28th proxies but the second-2nd proxy, being the second table of Druta, of the immediate lower-line should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-31).

As per rule No. 1 (a) the remainder (31-11) is '20'.

From the above remainder the first-1st proxy '22' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

Now, as per rule No. 5 (a), from the above remainder '20', the first-1st proxy '15' (20—15=5) and the second-2nd proxy '4' (5—4=1) of the above un-deducted proxy '22' could consecutively be subtracted and as per rule No. 4 write the third consecutive Anga, Laghu, leaving away the third-7th proxy '3'.

Later, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '2' of the above left-off proxy '3', could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above un-deducted proxy '2' could be subtracted and as per rule No. 4 write the second consecutive Anga, Druta.

Later, as per rule No. 6 (b), write the lowest Anga, Anudruta to fill-in the deficit value of the prastara.

Thus the series of this prastara consist of 'U O U I U'.

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30. What are the series of Angas pertaining to the 10th 5-ACP of 9-AP of Sankeerna-jati ?

To write 'Sankhya' for the upper-lines of Anudruta-meru of Sankeerna-jati of Shadanga-prastara, the total of all the 2nd, 9th, 18th, 27th and 36th but the first-1st proxy, being the first table of Anudruta, of the immediate lower-line should be written and now, as per rule No. 1 write the same upto the required permutation [refer tabla-35].

As per rule No. 2 (a) the remainder (21-10) is '11'.

From the above remainder the first-1st proxy '15' could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

Later, as per rule No. 5 [a], from the above remainder '11', the first-1st proxy '10' of the above un-deducted proxy '15' could be subtracted [11-10=1] and as per rule No. 4 write the socond consecutive Anga, Druta, leaving away the second-2nd proxy '5'.

Now, again as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '4' of the above left-off proxy '5', its first-1st proxy '3' and again its first-1st proxy '2', thus three first-1st proxies, could not consecutively be subtracted and as per rule No. 3 write three Angas, Anudrutas of the 1st proxy.

Later, again as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '1' of the above un-deducted last proxy '2', could be subtracted [1-1=0] and as per rule No. 4 write the second consecutive Anga, Druta.

Now, as per rule No. 6 [d] write an Anudruta, the lowest Anga to fill-in the deficit value of the prastara and also as it should be a 5-ACP.

Thus the series of this prastara consist of 'U O U U U O U',

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31. What are the series of Angas pertaining to the 17th 5-ACP of 9-AP of Sankeerna-jati ?

Follow the rule No. 1 as in example-30.

As per rule No. 2 [a] the remainder [21-17] is '4'.

From the above remainder the first-1st proxy '15', its first-1st proxy '10' and again its first-1st proxy '6', thus three first-1st proxies, could not consecutively be subtracted and as per rule No. 3 write three Angas, Anudrutas of the 1st proxy.

Later, as per rule No. 5 [a], from the above remainder '4', the first-1st proxy '3' of the above undeducted last proxy '6' could be subtracted [4—3=1] and as per rule No. 4 write the second consecutive Anga, Druta, leaving away the second-2nd proxy '3'.

Now, again as per rule No. 5 (a), from the last remainder '1', the first-1st proxy '1' of the above left-off proxy '3', could not be subtracted and as per rule No. 3 write the Anga, Anudruta of the 1st proxy.

Now, again as per rule No. 5 [a], from the last remainder '1', the first-1st proxy '1' of the above un-deducted proxy '2' could be subtracted [1-1=0] and as per rule No. 4 write the second consecutive Anga, Druta.

Later, as per rule No. 6 [d], write an Anudruta, the lowest Anga, to fill-in the deficit value of the prastara and also as it should be a 5-ACP.

Thus the series of this prastara of 'U O U O U U U'.

32. What are the series of unit-values pertaining to the 1st 1-UDP of 9–UP ?

To write 'Sankhya' for Samyuktanga–prastara the total of the figures of all the preceding houses, which are proxies, should be written and for the lowest–line of the table of one–unit the total of all the proxies except the 1st proxy, being the lowest devoid line of the first table of one-unit, should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-40).

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As per rule No. 2 (a) the remainder (21-1) is '20'.

From the above remainder the 2nd proxy '8' (20-8=12), the 3rd proxy '5' (12-5=7), the 4th proxy '3' (7-3=4), the 5th proxy '2' (4-2=2), the 6th proxy '1' (2-1=1) and the 7th proxy '1' (1-1=0), thus six proxies, could consecutively be subtracted and as per rules Nos. 4 &6 [e] as it amounts to eight houses, including the houses of the 1st proxy and the zero, write the figure '9' of 9–units.

Thus the series of this prastara consist of '9'.

33. What are the series of unit-values of the 6th 1-UDP of 9-UP?

Follow the rule No. 1 as in the example-32.

As per rule No. 2 (a) the remainder (21–6) is '15'.

From the above remainder the 2nd proxy '8' (15–8=7) and the 3rd proxy '5' (7-5=2) could consecutively be subtracted and as per rule No. 4 & 6 (e), as it amounts to three houses, write the figure '4' of 4-units leaving away the 4th proxy '3'.

Now, as per rule No. 5(a), from the last remainder '2', the 2nd proxy '1' (2-1=1) and the 3rd proxy '1' (1-1=0) of the above left-off proxy '3', could consecutively be subtracted and as per rules Nos. 4 & 6 (e) as it amounts to four houses, write the figure '5' of 5-units.

Thus the series of this prastara consist of '5 4'.

34. What are the series of unit-values of the 12th 1-UDP of 9-UP?

Follow the rule No. 1 as in example-32.

As per rule 2. (a) the remainder (21–12) is '9'.

From the above remainder the 2nd proxy '8' could be subtracted [9–8=1] and as per rules Nos. 4 & 5 [e] as it amounts to two houses, write the figure '2' or 2-units leaving away the 3rd proxy '5'.

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Now, as per rule No. 5 [a], from the last remainder '1', the 2nd proxy '2' of the left-off proxy' 5', could not be subtracted and as per rule No. 3 write figure '2' of the 2nd proxy.

Later, again as per rule No. 5 [a], from the last remainder '1', the 2nd proxy '2' of the above un-deducted proxy '2' could be subtracted [1–1=0] and as per rules Nos. 4 & 6 [e] as it amounts to three houses, including the houses of zero and the omitted 1st proxy, write figure '4' of 4-units.

Thus the series of this prastara consist of '4 2 3'.

35. What are the series of unit-values of the 19th 1-UDP of 9-UP?

Follow the rule No. 2 as in example–32.

As per rule No. 2 [a] the remainder [21–19] is '2'.

From the above remainder the 2nd proxy '8' could not be subtracted and as per rule No. 3 write figure '2' of the 2nd proxy.

Now, as per rule No. 5 (a), from the above remainder '2', the 2nd proxy '3' of the above un-deducted proxy '8' could not also be subtracted and as per rule No. 3 write one more figure '2' of the 2nd proxy.

Later, again as per rule No. 5 [a], from the above remainder '2', the 2nd proxy '1' (2–1=1) and the 3rd proxy '1' (1–1=0) of the above un-deducted proxy '3' could consecutively be subtracted and as per rules Nos. 4 & 6 (e) as it amounts to four houses, including the houses of zero and the omitted 1st proxy, write the next consecutive figure '5' or 5-units.

Thus the series of this prastara consist of '5 2 2'.

36. What are the series of unit-values of the 7th 1-UCP of 8-UP?

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To write 'Sankhya' for the upper-lines of the table of one-'unit' the total of all the preceding consecutive proxies but the 1st proxy, being the first table of one-unit, of the immediate lower-line should be written and as per rule No. 1 write the same upto the required permutation (refer table-40).

As per rule No. 1 (a) the remainder (26–7) is is '19'.

From the above remainder the lowest 1st proxy '8' (19–8=11) and the 2nd proxy '8' (11–8=3) could consecutively be subtracted and as per rule No. 4 write the next consecutive figure '3' leaving away the 3rd proxy '5'.

Now, as per rule No. 5 (a), from the last remainder '3', the lowest 1st proxy '2' of the above left-off proxy '5' could be subtracted (3–2=1) and as per rule No. 4 write the next consecutive figure '2' leaving away the 2nd proxy '2'.

Later, again as per rule No. 5 (a), from the last remainder '1', the lowest 1st proxy '1' of the above left-off proxy '2' could be subtracted (1–1=0) and as per rule No. 4 write the next consecutive figure '2'.

Now, as per rule No. 6 (e) write figure '1' to fill-in the deficit value of the prastara.

Thus the series of this prastara consist of '1 2 2 '3' (refer the permuted examples furnished at the end of this book).

37. What are the series of unit-values of the 9th 1-UCP of 8-UP?

Follow the rule No. 1 as in example–36.

As per rule No. 2 (a) the remainder (26–9) is '17'.

From the above remainder the lowest 1st proxy '8' (17–8=9) and the 2nd proxy '8' (9–8=1) could consecutively be subtracted and as per rule No. 4 write the 3rd consecutive figure '3', leaving away the 3rd proxy '5'.

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Now, as per rule No. 5 (a), from the last remainder '1', the lowest 1st proxy '2' of the above left-off proxy '5' could not be subtracted and as per rule No. 7 (b) write figure '1' of the 1st proxy.

Later, again as per rules Nos. 7 (b) & 5 (a), from the last remainder '1' the 2nd proxy '1' of the above undeducted proxy '2' could be subtracted (1–1=0) and as per rules Nos. 4 & 6 (e) as it amounts to three houses, including the zero and 1st proxy, write the figure '4' of 4-units.

Thus the series of this prastara consist of '4 1 3'.

38. What are the series of unit-values of the 11th 1-UCP of 8-UP?

Follow the rule No. 1 as in example-36.

As per rule No. 2(a) the remainder (26–11) is '15'.

From the above remainder the lowest 1st proxy '8' could be subtraced (15–8=7) and as per rule No. 4 write the figure '2' leaving away the 2nd proxy '8'.

Now, as per rule No. 5 (a), from the above remainder '7', the lowest 1st proxy '3' (7–3=4), the 2nd proxy '2' (4–2=2) and the 3rd proxy '2' [2–2=0] of the above left-off proxy '8' could consecutively be subtracted and as per rules Nos. 4 & 6 [e], as it amounts to four houses, including the house of zero, write the figure '5' of 5-units.

Later, as per rule No. 6 [e] write the figure '1' to fill-in the deficit value of the prastara.

Thus the series of this prastara consist of '1 5 2'.

39. What are the series of unit-values of the 14th 1-UCP of 8-UP?

Follow the rule No. 1 as in example-36.

As per rule No. 2 [a] the remainder [26–14] is '12'.

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From the above remainder the lowest 1st proxy '8' could be subtracted [12–8=4] and as per rule No.4 write the figure '2' leaving away the 2nd proxy '8'.

Now, as per rule No. 5 (a), from the last remainder '4', the lowest 1st proxy '3' of the above left-off proxy '8' could be subtracted (4–3=1) and as per rule No. 4 write the figure '2', leaving away the 2nd proxy '2'.

Again, as per rule No. 5 (a), from the last remainder '1', the lowest 1st proxy '1' of the above left-off proxy '2' could be subtracted (1-1=0) and now, as per rules Nos. 4 & 6 (e), as it amounts to two houses, including the house of zero, write the figure '3' of 3-units.

Later, as per rule No. 6 (e) write the figure '1' to fill-in the deficit value of the prastara.

Thus the series of this prastara consist of '1 3 2 2'.

40. What are the series of unit-values of the 16th 1-UCP of 8-UP ?

Follow the rule No. 1 as in example-36.

As per rule No. 2 (a) the remainder (26-16) is '10'.

From the above remainder the lowest 1st proxy '8' could be subtracted (10-8=2) and as per rule No. 4 write the figure '2' leaving away the 2nd proxy '8'.

Now, as per rule No. 5 (a), from the last remainder '2', the lowest 1st proxy '3' of the above left-off proxy '8' could not be subtracted and as per rule No. 7 (b) write the figure '1'.

Later, as per rules Nos. 7 (b) & 5 (a), from the last remainder '2', the 2nd proxy '1' (2-1=1) and the 3rd proxy '1' (1-1=0) of the above un-deducted proxy '3' could consecutively be subtracted and as per rules Nos. 4 & 6 (e), as it amounts to four houses, including the houses of zero and the omitted 1st proxy, write the figure '5' of 5-units.

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Thus the series of this prastara consist of '5 1 2'.

41. What are the series of unit-values of the 18th 2-UDP of 7-UP ?

To write 'Sankhya' for the lowest-line of the 'Table of 2-units', the total of all the preceding and consecutive proxies, except the 2nd proxy, being the lowest devoid line of the second table of 2-units, should be written and now, as per rule No. 1 write the same upto the required permutation (refer table-41).

As per rule No. 2 (a) the remainder (21-18) is '3'.

From the above remainder three 1st proxies, '12, 7 & 4' could not consecutively be subtracted and as per rule No. 3 write the figure '1' three times.

Now, as per rule No. 5 (a), from the above remainder '3', the 1st proxy '2' (3-2=1) and the 3rd proxy '1' (1-1=0) of the above un-deducted last proxy '4', could consecutively be subtracted and as per rules Nos. 4 & 6 (e), as it amounts to three houses, including the omitted 2nd proxy, write the figure '4' of 4-units.

Thus the series of this prastara consist of '4 1 1 1'.

42. What are the series of unit-values of the 12th 1-2-UCP of 7-UP ?

To write 'Sankhya' for the upper-lines of the 'Table of 2-units', the total of all the preceding and consecutive proxies but the 2nd proxy, being the second table of 2-units, of the immediate lower-line, should be written and as per rule No. 1, write the same upto the required permutation (refer table- 41).

As per rule No. 2 (a) the remainder (26-12) is '14'.

From the above remainder the 1st proxy '13', could be subtracted (14-13=1) and as per rule No. 4 write the figure '2'. leaving away the 2nd proxy '7'.

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Now, as per rules Nos. 7 (a) 5 (a), from the last remainder '1', two 1st proxies '4 & 2' of the above left-off proxy '7', could not consecutively be subtracted and as per rule No. 3 write the figure '1' two times.

Later, as per rule No. 5 (a), from the last remainder '1', the 1st proxy '1' of the above un-deducted last proxy '2', could be subtracted (1-1=0) and as per rule No. 4, figure '2' has to be written. But, as it is contrary to write more than one Anga of 2-units, being single-Anga or figure-consistent-permutation of 2-units, as per rules Nos. 5 (c) and 6 (e), instead of writing figure '2' of 2-units, figure '3' of 3-units should only be written.

Thus the series of this prastara consist of '3112'.

43. What are the series of unit-values pertaining to the 17th 1-2-UCP of 7-UP ?

Follow the rule No. 1 as in example-42.

As per rule No. 2 (a) the remainder (26-17) is '9'.

From the above remainder the 1st proxy '13' could not be subtracted and as per rule No. 3 write the figure '1' of the 1st proxy.

Later as per rule No. 5 (a), from the above remainder '9', the 1st proxy '6' of the above un-deducted proxy '13' could be subtracted (9-6=3) and as per rule No. 4 write the figure '2' leaving away the lowest 2nd proxy '4'.

Now, as per rules Nos. 7 (a) & 5 (a), from the last remainder '3', the 1st proxy '2' (3-2=1) and the 3rd proxy '1' (1-1=0) of the above left-off proxy '4' could consecutively be subtracted and as per rules Nos. 4 & 6 (e), as it amounts to '3' houses, including the omitted 2nd proxy, write the figure '4' of 4-units.

Thus the series of this prastara consist of '421'.

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(b) VILOMA - NASHTA :

44. What are the series of Angas of the 18th DDP of 12-DP ?

As per rule rule No. 1 write Sankhya upto the required permutation.

As per rule No. 2 (b) subtract figure '1' from the question-number (18-1=17).

Later follow as in Nashta (refer example-1) and obtain the answer series 'I S I S'.

45. What are the series of Angas of the 21st 2-DCP of 8-DP ?

As per rule No. 1 write Sankhya upto the required permutation.

As per rule No. 2 (b) subtract figure '1' from the question-number (21-1=20).

Later follow as in Nashta (refer example-5) and obtain the answer series 'O O S I'.

(c) MADHYARUPA-NASHTA :

(i) UPARISTHITA-NASHTA :

46. What are the series of Angas of the 3rd Viloma-prastara from the MN pertaining to the DDP of 12-DP? (OMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of the DDP of 12-DP is of odd-number '29' the MN is '15'.

As per rule No. 2 (c) (i) add the question-number '3' to the MN '15' (15+3=18) and being odd-number of Sankhya, further subtract figure '1' also from the above total (18-1=17). The remainder '17' is the SF which, as per Nashta, gives out the answer-series 'I S I S',

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47. What are the series of Angas of the 2nd Viloma-prastara pertaining to the DDP of 8-DP from the MN ? (EMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of the DDP of 8-DP is of even-number '8' the MN is Anuloma-4.

As per rule No. 2 (c) (i) add the question-number '2' to the MN '4' (2+4=6) and the total figure '6' is the SF which, as per Nashta, gives out the answer-series 'I S'.

48. Whar are the series of Angas of the 4th Viloma prastara, from the MN, pertaining to the 2-DCP of 8-DP? (OMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 2-DCP of 8-DP is of odd-number '25' the MN is '13'.

As per rule No. 2 (c) (i) add the question-number '4' to the MN '13' (13+4=17) and being odd-number of Sankhya further subtract figure '1' also from the above total (17–1=16). The remainder '16' is the SF, which, as per Nashta, gives out the answer-series 'O S O I' (refer example-6).

49. What are the series of Angas of the 7th Viloma-prastara, from the MN, pertaining to the 1-DCP of 9-DP? (EMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 1-DCP of 9-DP is of even-number '28' the MN is Anuloma-14.

As per rule No. 2 (c) (i) add the question-number '7' to the MN '14' (14+7=21). This total '21' is the SF, which, as per Nashta, gives out the answer-series 'S O S'.

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(ii) ATHASTHITA-NASHTA :

50. What are the series of Angas of the 1st Anuloma-prastara, from the MN, pertaining to DDP of 12-DP? (OMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of the DDP of 12-DP is of odd-number '29' the MN is '15'.

As per rule No. 2 (c) (ii) subtract the question-number '1' from the MN '15' (15–1=14) and being odd-number of Sankhya further subtract figure '1' also from the above remainder (14–1=13). The remainder '13' is the SF, which, as per Nashta, gives out the answer-series 'S S I'.

51. What are the series of Angas of the 3rd Anuloma-prastara, from the MN, pertaining to the DDP of 8-DP? (EMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of the DDP of 8-DP is of even-number '8' the MN is Anuloma-4.

As per rule No. 2 (c) (ii) subtract the question number '3' from the MN '4' (4–3=1). The remainder '1' is the SF, which, as per Nashta, gives out the answer-series 'S I I'.

52. What are the series of Angas of the 7th Anuloma-prastara, from the MN, pertaining to 2-DCP of 8-DP? (OMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of the 2-DCP of 8-DP is of odd-number '25' the MN is '13'.

As per rule No. 2 (c) (ii) subtract the question-number '7' from the MN '13' (13–7=6) and being odd-number of Sankhya further subtract figure '1' also from

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the above remainder (6–1=5). The remainder '5', is the SF, which, as per Nashta, gives out the answer-series 'S O I O' (refer example-11).

53. What are the series of Angas of the 9th Anuloma-prastara, from the MN, pertaining to 1-DCP of 9-DP? (EMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 1-DCP of 9-DP is of even-number '28' the MN is '14'.

As per rule No. 2 (c) (ii) subtract the question-number '9' from the MN '14' (14–9=5). The remainder '5' is the SF, which, as per Nashta, gives out the answer series 'S S O'.

4.2 U D D I S H T A

Uddishta is the easy method to obtain the serial number of any prastara in question consisting of a particular series of Angas or figures, basing upon the figures of Sankhya and also applying the same rules governing 'Nashta'.

As per rules governing 'Nashta' the un-deducted proxies always originate the inferior (least) Angas or figures and the deducted proxies always originate the superior Angas or figures. In a question-series of Angas or figures of a prastara take out the proxies which have successfully been subtracted and originated the 'Superiors'-figure (SF)'.

(a) ANULOMA-UDDISHTA :

The SF should be subtracted from the respective Sankhya and the remainder is the required answer-serial-number.

(b) VILOMA-UDDISHTA :

Add figure '1' to the SF and the total is the required answer-serial-number.

(c) MADHYARUPA-UDDISHTA :

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(i) UPARISTHITA-UDDISHTA :

For Sankhya of both odd and even-numbers subtract the MN from the SF and for Sankhya of odd-numbers further add figure '1' also to the remainder and the last figure is the Viloma-serial-number of the question-prastara from the MN.

(ii) ATHASTHITA-UDDISHTA :

For Sankhya of both odd and even-numbers subtract the SF from the MN and for Sankhya of odd-numbers subtract figure '1' from the above remainder and the last figure is the Anuloma-serial-number of the question-prastara from the MN.

AKHANDA-PRASTARA

(a) ANULOMA-UDDISHTA :

1. What is the serial number of the 12-DP consisting of the series 'I O Ś O I'?

Write the figures of Sankhya upto the required permutation (refer table-1).

I	O	Ś	O	I
1	(2)	16	(108)	350
		33		[196]
		10		
		[3]		

In the above figures mentioned just below the Angas the un-deducted proxies, from which the inferior Angas, Drutas, have been originated, are shown in small brackets and the proxies, which have been left-off after obtaining superior Angas, are shown in big brackets and the proxies, which have successfully been subtracted and originated superior Angas are shown without any signs.

SF of the question-series : 350+61+33+10+1=455
Serial number of the prastara : 632—455=177.

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2. What is the serial number of 12-AP of Trisra-Jati consisting of the series 'S I O U'?

Write figures of Sankhya upto the required permutation (refer table-8).

S	I	O	U
13	86		(565)
7	46	302	
4	[25]	[162]	

SF of the question series : 302+86+46+13+7+4=458

Serial number of the prastara : 1059–458=601

3. What is serial number of 12-AP of Chaturashra -jati consisting of the series 'I O I O'?

Write the figures of Sankhya upto the required permutation (refer table-16)

I	O	I	O
3	10	98	306
2	[6]	56	(174)
		[18]	

SF of the question series : 306+98+56+10+3+2=475

Serial number of the prastara : 543—475=68

4. What is the serial number of 12-AP of Khanda -jati consisting of the series 'U I I U'?

Write figures of Sankhya upto the required pertation (refer table-23).

U	I	I	U
	9	129	(220)
	5	75	
		[15]	

SF of the question series : 129+75+9+5=218

Serial number of the prastara : 377—218=159

5. What is the serial number of 12-AP of Mishra -jati consisting of the series 'U O U U O U U O U'?

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Write figures of Sankhya upto the required permutation (refer table-29).

U	O	U	U	O	U	U	O	U
	2	(3)	(5)	13	(22)	(36)	99	(164)
				[8]			[60]	

SF of the question series : 99+13+2=114
Serial number of the prastara : 271—114=157

6. What is the serial number of 12-AP of Sankeerna-jati consisting of the series 'O U O U O U O U'?

O	U	O	U	O	U	O	U
1	(2)	5	(8)	21	(34)	91	(149)
		[3]		[13]		[56]	

SF of the question series : 91+21+5+1=118
Serial number of the prastara : 243—118=125

7. What is the serial number of 12-UP consisting of the series '2 1 1 2 1 1 2 1 1'?

Write figures of Sankhya upto the required permutation (refer table-39).

2	1	1	2	1	1	2	1	1
1	(2)	(4)	16	(32)	(64)	256	(512)	(1024)
			[8]			[128]		

SF of the question series : 256+16+1=273
Serial number of the prastara :2048—273=1775

(b) VILOMA-UDDISHTA :

8. What is the Viloma-serial-number of the 12-DP consisting of the series 'I O S O I'?

Write figures of Sankhya upto the required permutation (refer example-1)

SF of the question series : 350+ 61+33+10+1=455

As per rule No. (b) add figure '1' to the SF (455+1) and the total '456' is the answer-serial-number of the question series.

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(NOTE : The corresponding Anuloma-serial-number of the above Viloma-serial-number '456' is —— 632—456=176+1=177 and the corresponding Viloma -serial-number of this Anuloma-serial-number '177' is ——632—177=455+1=456.)

(c) MADHYARUPA-UDDISHTA :

(i) UPARISTHITA-UDDISHTA :

9. What is the Viloma-serial-number of the series 'S I' of 6-DP from the MN? (OMNU)

Write figures of Sankhya as per rule No.1 upto the required permutation.

As Sankhya of 6-DP is of odd-number '19' the MN is '10'.

SF of the question-series (10+3+2) is '15'.

As per rule No. c (i) subtract the MN '10' from the SF '15' (15 –10=5) and being odd-number of Sankhya further add figure '1' also to the remainder (5+ 1=6). The total '6' is the Viloma-answer-serial-number.

10. What is the Viloma-serial-number of the series 'I O I' of 5-DP from the MN? (EMNU)

As per rule No. 1 of Nashta write down Sankhya upto the required permutation.

As Sankhya of 5-DP is of even-number '10' the MN is '5'.

SF of the question-series (6+1) is '7'.

As per rule No. c (i) subtract the MN '5' from the SF '7' (7—5=2).

The remainder '2' is the Viloma-answer-serial-number of the question series.

11. What is the Anuloma-serial-number of the series 'I O O O O' of 6-DP from the MN ? (OMNL)

As per rule No. 1 of Nashta write down Sankhya upto the required permutation.

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As Sankhya of 6-DP is of odd-number '19' the MN is '10'.

SF of the question series is '1'.

As per rule No. c (ii) subtract the SF '1' from the MN '10' (10—1=9) and being odd-number of Sankhya further subtract figure '1' also from the remainder (9—1=8).

The remainder '8' is the Anuloma-answer-serial-number of the question series.

12. What is the Anuloma-serial-number of the series 'I O O O' of 5-DP from the MN ? (EMNL)

As per rule No. 1 of Nashta write down Sankhya upto the required permutation.

As Sankhya of 5-DP is of even-number '10' the MN is '5'.

SF of the question series is '1'.

As per rule No. c (ii) subtract the SF '1' from the MN '5' (5—1=4)

The remainder '4' is the Anuloma - answer - serial - number of the question series.

KHANDA - PRASTARA

(a) ANULOMA-UDDISHTA :

1. What is the serial number of DDP of 9-DP consisting of the series 'S S' ?

As per rule No. 1 write Sankhya upto the required permutation.

NOTE : It should be noted that the lowest Anga for the lowest-line of Druta-meru is Laghu as it is DDPs' line.

S	S
2	15
1	8

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SF of the question Series 15+8 +2+1=26
Serial number of the prastara : 29—26=3.

2. What is the serial number of DDP of 9-DP consisting of the series 'S I S'?

As per rule No. 1 write Sankhya upto the required permutation.

S	I	S
2	[4]	15
1		[8]

SF of the question series : 15+2+1=18
Serial number of the prastara : 29—18=11

3. What is the serial number of DDP of 9-DP consisting of the series 'S I S I'?

As per rule No. 1 write Sankhya upto the required permutation.

S	I	S	I
1	(2)	8	(15)
		[4]	

SF of the question series : 8+1=9
Serial number of the prastara : 29—9=20

4. What is the serial number of DDP of 9-DP consisting of the series '+ I I'?

As per rule No. 1 write Sankhya uptothe required permutation.

+	I	I
4	(8)	(15)
2		
1		

SF of the question series : 4+2+1=7
Serial number of the prastara : 29—7=22

5. What is the serial number of 1-DCP of 9-DP consisting of the series 'I O S'?

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As per rule No. 1 write Sankhya upto the required permutation.

I	O	S
		8
		12
		5

NOTE :- It should be noted that the above Druta and Laghu after Pluta are written to fill-in the deficit value of the prastara.

SF of the question series : 8+12+5=25

Serial number of the prastara : 28—25=3

6. What is the serial number of 1-DCP of 9-DP consisting of the series 'S O S'?

As per rule No. 1 write Sankhya upto the erquired permutation.

S	O	S
1	(2)	8
		12
		[5]

SF of the question series : 8+12+1=21
Serial number of the prastara : 28—21=7

7. What is the serial number of 1-DCP of 9-DP consisting of the series 'S O I I'?

As per rule No. 1 write Sankhya upto the required permutation.

S	O	I	I
1	(2)	4	8
		[5]	[12]

SF of the question series : 8+4+1=13
Serial number of the prastara : 28—13=15

8. What is the serial number of 2-DCP of 8-DP consisting of the series 'O I O S'?

As per rule No. 1 write Sankhya upto the required permutation,

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O	I	O	S
	1	(2)	12
			9
			[3]

SF of the question series : 12+9+1=22
Serial number of the prastara : 25-22=3

9. What is the serial number of 1–ACP of 10–AP pertaining to Trisra-jati consisting of the series 'S I U' ?

As per rule No. 1 write Sankhya upto the required permutation.

S	I	U
1	3	(8)
1	[3]	

SF of the question series : 3+1+1=5

Serial number of the prastara : 32–5=27

10. What is the serial number of 1–UCP of 8–UP consisting of the series '2 3 1 2' ?

As per rule No. 1 write Sankhya upto the required permutation.

2	3	1	2
	1	(3)	8
			[8]

SF of the question series : 8+1=9
Serial number of the prastara : 26–9=17

11. What is the serial number of 1–UCP of 8–UP consisting of the series '4 3 1' ?

As per rule No. 1 write Sankhya upto the required permutation.

4	3	1
1	3	(8)
	[2]	

SF of the question series : 3+1=4

Serial number of the prastara : 26–4=22

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(b) VILOMA-UDDISHTA :

12. What is the Viloma-serial-number of the DDP of 12-DP consisting of the series 'I S I S'?

As per rule rule No. 1 write Sankhya upto the required permutation.

SF of the question series (15+2) is '17'?

As per rule No. (b) add figure '1' to the SF (17+1) and the total '18' is the Viloma-answer-serial number of the question series.

13. What is the Viloma-serial-number of 2-DCP of 8-DP consisting of the series 'O O S I'?

As per rule No. 1 write Sankhya upto the required permutation.

SF of the question series (12+5+3) is '20'.

As per rule No. (b) add figure '1' to the SF (20+1) and the total '21' is the Viloma-answer-serial-number of the question series.

(c) MADHYARUPA-UDDISHTA :

(i) UPARISTHITA-UDDISHTA :

14. What is the Viloma-serial-number of the DDP of 12-DP from the MN consisting of the series 'I S I S'? (OMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of DDP of 12-DP is of odd-number '29' theMN is '15'.

SF of question series (15+2) is '7'.

As per rule No. c (i) subtract the MN '15' from the SF '17' (17–15=2) and being odd number of Sankhya further add figure '1' also to the remainder (2+1 =3). The total '3' is the Viloma-answer-serial-number of the question series.

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15. What is the Viloma-serial-number of the DDP of 8-DP from the MN consisting of series 'I S'? [EMNU]

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of DDP 12-DP is of even-number '8' the MN is Anuloma-4.

SF of the question series (4+2) is '6,.

As per rule No. c (i) subtract the MN '4' from the SF '6' (6–4=2) and the remainder is the Viloma-answer-serial-number of the question series.

16. What is the Viloma-serial-number of the 2–DCP of 8-DP from the MN consisting of the series 'O S O I'? (OMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 2-DCP of 8-DP is of odd-number '25' the MN is '13'.

SF of the question series (12+4) is '16'.

As per rule No. c (i) subtract the MN '13' from the SF '16' (16–13=3) and being odd-number of Sankhya further add figure '1' also to [the remainder (3+1 =4). The total '4' is the Viloma-serial-number of the question series.

17. What is the Viloma-serial-number of the 1-DCP of 9-DP from the MN consisting of the series 'S O S'? (EMNU)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 1-DCP of 9-DP is of even-number '28' the MN is '14'.

SF of the question series (8+12+1) is '21'.

As per rule No. c (i) subtract the MN '14' from the SF '21' (21—14=7) and the remainder '7' is the Viloma-answer-serial-number of the question series.

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(ii) ATHASTHITA-UDDISHTA :

18. What is the Anuloma-serial-number of the DDP of 12-DP from the MN consisting of the series 'S S I' ? (O M N L)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of DDP of 12-DP is of odd-number '29' the MN is '15'.
SF of the question series (8+4+1) is '13'.

As per rule No. c (ii) subtract the SF '13' from tho MN '15' (15–13=2) and being odd-number of Sankhya further subtract figure '1' also from the above remainder '2' (2–1=1). The last remainder '1' is the Anuloma-answer-serial-number of the question-series.

19. What is the Anuloma-serial-number of the DDP of 8-DP from the MN consisting of the series 'S I I' ? (EMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of DDP of 8-DP is of even-number '8' the MN is Anuloma-4.
SF of the question series is '1'.

As per rule No. c (ii) subtract the SF '1' from the MN '4' (4–1=3) and the remainder '3' is the Anuloma-answer-serial-number of the question series.

20. What is the Anuloma-serial-number-of the 2-DCP of 8-DP from the MN consisting of the series 'S O I O'? (OMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 2-DCP of 8-DP is of odd-number '25' the MN is '13'.
SF of the question series (4+1) is '5'.

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As per rule No. c (ii) subtract the SF '5' from the MN '13' (13–5=8) and being odd-number of Sankhya further subtract figure '1' also from the above remainder (8-1=7). The last remainder '7' is the Anuloma-answer-serial-number of the question series.

21. What is the Anuloma-serial-number of the 1-DCP of 9-DP from the MN consisting of the series 'S S O'? (EMNL)

As per rule No. 1 write Sankhya upto the required permutation.

As Sankhya of 1-DCP of 9-DP is of even-number '28' the MN is Anuloma-14.
SF of the question series is (4+1) is '5'.

As per rule No. c (ii) subtract the SF '5' from the MN '14' (14–5=9) and the remainder '9' is the Anuloma-answer-serial-number of the question series.

4. 3. KALITA

'Kalita' is the easy method for obtaining the full particulars of all the Angas of figures used in the process of permutation upto the required prastara in question. To obtain these particulars one should carefully go through the figures of both 'Sankhya and Mahapatala' as per the procedure furnished in the following examples.

(i) AKHANDA - PRASTARA :-
QUESTION :-

Give the particulars of all the Angas occur upto the 50th prastara of 8-DP.

In the mode of Panchanga-prastara the 1st, 2nd, 4th, 6th and 8th proxies represent Druta, Laghu, Guru, Pluta and Kakapada respectively and the particulars of 'Sankhya and Mahapatala' should be written upto the required prastara in question (refer table-1).

In the first instance we can have a clear picture of all the Angas occurring in 8-DP by means of the figures of 'Sankhya and Mahapatala',

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As per the table, in the 8-DP, according to the :

1st proxy there is/are 33 DEPs,
2nd -do- 19 LEPs,
4th -do- 6 GEPs,
6th -do- 2 PEPs and
8th -do- 1 KEP

— totalling to '61' prastaras.

The constituent Angas of these '61' prastaras are as follows :

(a) As per the 1st DEP-proxy '33' and its corresponding lower figure '147' of Mahapatala, it should be understood that apart from these '33' Drutas which are in the extreme right end of these prastaras, there are '147' other Angas also thus totalling to (33+147) '180' Angas of these '33' DEPs. Here it is interesting to know that there are only '180' Drutas in all these '61' prastaras. It may also be noted that in these '33' DEPs, there are '2' Plutas, according to the total (1+1=2) of the 6th PEP-proxy '1' and its corresponding lower figure '1' of Mahapatala, '10' Gurus, according to the total (3+7=10) of the 4th GEP-proxy '3' and its corresponding lower figure '7' of Mahapatala, '44' Laghus, according to the total (10+34=44) of the 2nd LEP-proxy '10' and its corresponding lower figure '34' of Mahapatala and '91' Drutas, according to the total (19+72=91) of the 1st DEP-proxy '19' and its corresponding lower figure '72' of Mahapatala thus striking the total (33D+2P+10G 44L+91D) to '180' Angas.

(b) As per the 2nd LEP-proxy '19' and its corresponding lower figure '72' of Mahapatala, it should be understood that apart from the '19' Laghus which are in the extreme right end of these prastaras, there are '72' other Angas also thus totalling to (19+72) '91' Angas in these '19' LEPs. Here it is interesting to know that there are only '91' Laghus in all these '61' prastaras. It may also be noted that

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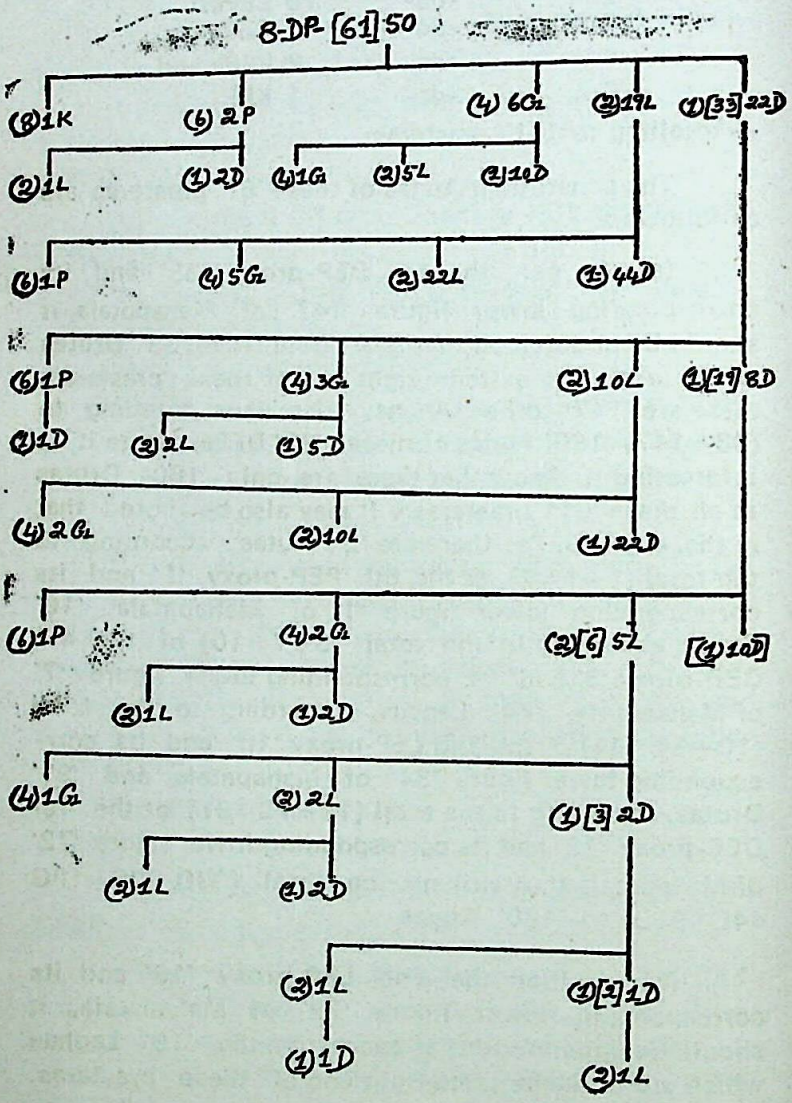
Explanatory diagram of 8-DP (Akhanda-prastara) of Kalita



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Explanatory table of 8-DP (Akhanda-prastara) of Kalita

S	K 8	P 6	G 4	L 2	D 1	M
1	1	-	-	-	-	1
2	-	2	-	-	-	2
,,	-	-	-	1	2	3
6	-	-	6	-	-	6
,,	-	-	1	5	10	16
19	-	-	-	19	-	19
,,	-	1	5	22	44	72
28	1	3	12	47	56	119
22	-	-	-	-	22	22
	-	1	-	-	-	1
	-	-	-	-	1	1
	-	-	3	-	-	3
	-	-	-	2	5	7
	-	-	-	10	-	10
	-	-	2	10	22	34
	-	-	-	-	8	8
	-	1	-	-	-	1
	-	-	2	-	-	2
	-	-	-	1	2	3
	-	-	-	5	-	5
	-	-	1	-	-	1
	-	-	-	2	-	2
	-	-	-	1	2	3
	-	-	-	-	2	2
	-	-	-	1	1	2
	-	-	-	1	1	2
22	-	2	8	33	66	109
50	1	5	20	80	122	228

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in the '19' LEPs there are '1' Pluta, according to the 6th PEP-proxy '1', '5' Gurus, according to the total (2+3 =5) of the 4th GEP-proxy '2' and its corresponding lower figure '3' of Mahapatala, '22' Laghus, according to the total (6+16=22) of the 2nd LEP-proxy '6' and its corresponding lower figure '16' of Mahapatala and '44' Drutas, according to the total (10+34=44) of the 1st DEP-proxy '10, and its corresponding lower figure '34' of Mahapatala thus striking the total (19L+1P+5G+ 22L+44D) to '91' Angas.

(c) As per the 4th GEP-proxy '6' and its corresponding lower figure '16' of Mahapatala, it should be understood that apart from the '6' Gurus which are in the extreme right end of these prastaras, there are '16' other Angas also thus totalling to (6+16) '22' Angas in these '6' GEPs. Here it is interesting to know that there are '22' Gurus only in all these '61' prastaras. It may also be noted that in these '6' GEPs there are '1' Guru, according to the 4th GEP-proxy '1', '5' Laghus, according to the total (2+3=5) of the 2nd LEP-proxy '2' and its corresponding lower figure '3' of Mahapatala and '10' Drutas, according to the total (3+7=10) of the 1st DEP-proxy '3' and its corresponding lower figure '7' of Mahapatala thus striking the total (6G+1G+5L+ 10D) to '22' Angas.

(d) As per the 6th PEP-proxy '2' and its corresponding lower figure '3' of Mahapatala, it should be understood that apart from the '2' Plutas which are in the extreme right end of these prastaras, there are '3' other Angas also thus totalling to (2+3) '5' Angas in these '2' PEPs. Here it is interesting to know that there are only '5' Plutas in all the '61' prastaras. It may also be noted that in these '2' PEPs there are '1' Laghu, according to the '2' LEP-proxy '1' and '2' Drutas, according to the total (1+1=2) of the 1st DEP-proxy '1' and its corresponding lower figure '1' of Mahapatala thus striking the total to (2P+1L+2D) '5' Angas.

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(e) As per the 8th proxy '1', as its corresponding lower figure of Mahapatala does not exist, it should be understood that there is only '1' KEP with a single Anga i.e., Kakapada (had there been some correspon ding lower figure of Mahapatala beneath this 'Sankhya' figure '1', there would have been the union of some other Anga along with this Kakapada).

By the above explanation it is evident that (1) any proxy indicates the total number of prastaras ending with the Anga concerned, (2) the total of a proxy and its corresponding lower figure of Mapatala indicate the total number of all the different Angas occuring in all the prastaras ending with the Anga concerned and (3) the total of a proxy and its corresponding lower figure of Mahapatala also indicates the number of times that particular Anga occurred totally in all the prastaras.

For an easy understanding of the above explanation a diagram and a table also have been furnished. In addition another similar diagram and a table consisting of the inner details have also been furnished pertaining to this question concerned to obtain the answer.

(ii) KHANDA-PRASTARA :

QUESTION : Give the details of all the Angas occurring upto the 20th DDP of 12-DP.

In the first instance we can have a clear picture of all the Angas occurring in the DDPs of 12-DP.

As per the key-rules of the lowest-line of Drutameru write the figures of 'Sankhya and Mahapatala' upto the required 12-DP (refer table-2).

As per the table, in the 12-DP, according to the :

2nd proxy there are 15 LEPs,

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4th proxy there are 8 GEPs,
6th proxy there are 4 PEPs and
8th proxy there are 2 KEPs

— totalling to '29' prastaras.

The constituent Angas of these '29' prastaras are as follows :

(a) As per the 2nd LEP-proxy '15' and its corresponding lower figure '47' of Mahapatala it should be understood that apart from the '15' Laghus which are in the extreme right end of these prastaras, there are '47' other Angas also thus totalling to (15+47) '62' Angas in all these 16-LEPs. Here it is interesting to know that there are only '62' Laghus in all these '29' prastaras. It may also be noted that in the 15-LEPs there are '2' Kakapadas, according to the total (1+1=2) of the 8th proxy '1' and its corresponding lower figure '1' of Mahapatala, '5' Plutas, according to the total (2+3=5) of the 6th proxy '2' and its corresponding lower figure '3' of Mahapatala, '12' Gurus, according to the total (4+8=12) of the 4th proxy '4' and its corresponding lower figure '8' of Mahapatala and '28' Laghus, according to the total (8+20=28) of the 2nd proxy '8' and its corresponding lower figure '20' of Mahapatala thus striking the total (15L+2K+5P+12G+28L) to '62' Angas.

(b) As per the 4th GEP-proxy '8' and its corresponding lower figure '20' of Mahapatala it should be understood that apart from the '8' Gurus which are in the extreme right end of these prastaras, there are '20' other Angas also thus totalling to (8+20) '28' Angas in all in these 8-GEPs. Here it is interesting to know that there are '28' Gurus only in all these '29' prastaras. It may also be noted that in these 8-GEPs there are '1' Kakapada, according to the 8th KEP-proxy '1', '2' Plutas, according to the total (1+1=2) of the 6th PEP-proxy '1' and its corresponding lower figure '1' of Mahapatala, '5' Gurus, according to the total (2+3=5) of the 4th GEP-proxy '2' and its correspon-

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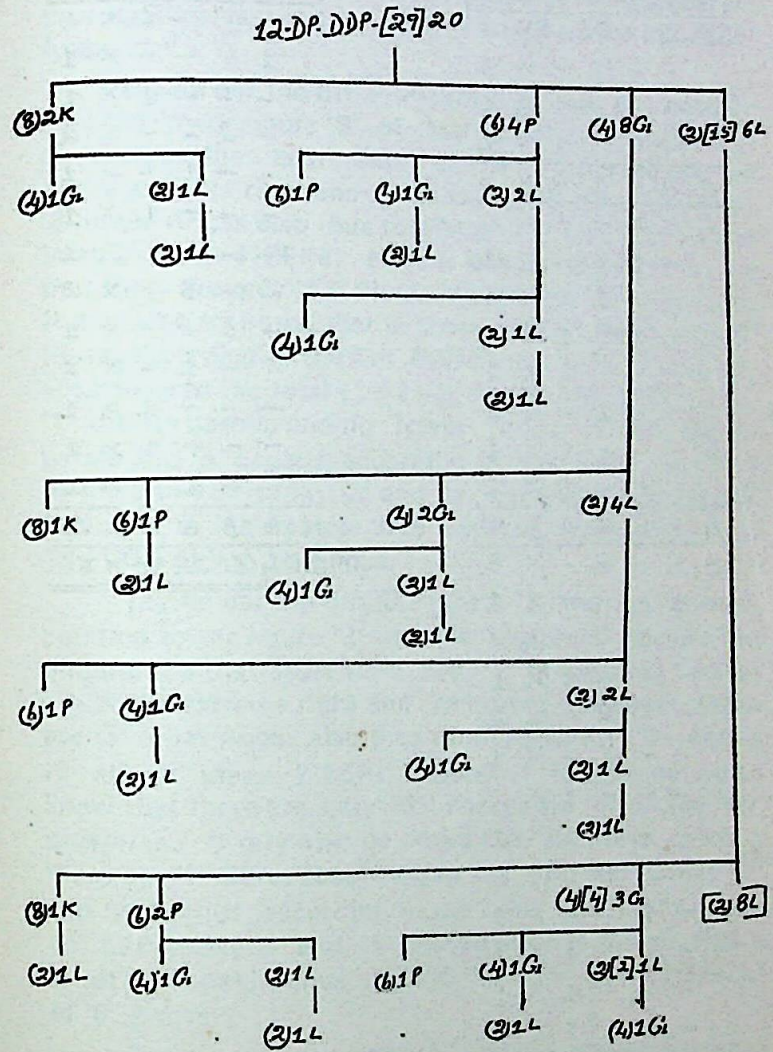
Explanatory diagram of DDP of 12-DP (Khanda - prastara) of Kalita



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Explanatory table of DDP of 12-DP (Khanda-prastara) of Kalita

S	K 8	P 6	G 4	L 2	D 1	M
2	2	-	-	-	×	2
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
2	2	-	1	2	×	5
4	-	4	-	-	×	4
	-	1	-	-	×	1
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	2	×	2
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
4	-	5	2	5	×	12
8	-	-	8	-	×	8
	1	-	-	-	×	1
	-	1	-	-	×	1
	-	-	-	1	×	1
	-	-	2	-	×	2
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
	-	-	-	4	×	4
	-	1	-	-	×	1
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	2	×	2
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
8	1	2	1	2	×	18

S	K 8	P 6	G 4	L 2	D 1	M
6	-	-	-	6	×	6
	1	-	-	-	×	1
	-	-	-	1	×	1
	-	2	-	-	×	2
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
	-	-	3	-	×	3
	-	1	-	-	×	1
	-	-	1	-	×	1
	-	-	-	1	×	1
	-	-	-	1	×	1
	-	-	1	-	×	1
6	1	3	6	11	×	21
20	4	10	22	30	×	66

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ding lower figure '3' of Mahapatala and '12' Laghus, according to the total (4+8=12) of the 2nd LEP-proxy '4' and its corresponding lower figure '8' of Mahapatala thus striking the total to (8G+1K+2P+5G+12L) '28' Angas.

(c) As per the 6th PEP-proxy '4' and its corresponding lower figure '8' of Mahapatala, it should be understood that apart from the '4' Plutas which are in the extreme right end of these prastaras, there are '8' other Angas also thus totalling to (4+8) '12' Angas in all in these 4-PEPs. Here it is interesting to know that there are only '12' Plutas in all these '29' prastaras. It may also be noted that in these 4-PEPs there are '1' Pluta, according to the 6th PEP-proxy '1', '2' Gurus, according to the total (1+1=2) of the 4th PEP-proxy '1' and its corresponding lower figure '1' of Mahapatala and '5' Laghus, according to the total (2+3=) of the 2nd LEP-proxy '2' and its corresponding lower figure '3' of Mahapatala thus striking the total (4P+1P+2G+5L) to '2' Angas.

(d) As per the 8th KEP-proxy '2' and its corresponding lower figure '3' of Mahapatala, it should be understood that apart from the '2' Kakapadas which are in the extreme right end of these prastaras, there are '3' other Angas also thus totalling (2+3) '5' Angas in all in these 2-KEPs. Here it is interesting to know that there are only '5' Kakapadas in all the '29' prastaras. It may also be noted that in these 2-KEPs there are '1' Guru, according to the 4th GEP-proxy '1' and '2' Laghus, according to the total (1+1=2) of the 1st LEP-proxy '1' and its corresponding lower figure '1' of Mahapatala thus striking the total (2K+1G+2L) to '5' Angas.

For an easy understanding of the above explanation a diagram and a table also have been furnished. In addition, another similar diagram and a table consisting of the inner details have also been furnished pertaining to this question concerned to obtain the answer.

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QUESTION : Give the details of all the Angas occurring upto the 20th 2-DCP of 5-DP.

In the first instance we can have a clear picture of all the Angas occurred in the 2-DCPs of 8-DP.

As per the key-rules of the lowest and upper-lines of Druta-meru write the figures of 'Sankhya and Mahapatala' upto the required 8-DP (refer table-2).

As per the table, in the 2-DCPs of 8-DP, according to the :

1st proxy	there is/are	12 DEPs,
2nd	-do-	9 LEPs,
4th	-do-	3 GEPs and
6th	-do-	1 PEP

—totalling to '25' prastaras.

The constituent Angas of these '25' prastaras are as follows :

(a) As per the lower 1st proxy '12' and its corresponding lower figure '38' of Mahapatala, it should be understood that apart from the '12' Drutas which are in the extreme right end of these prastaras there are '38' other Angas also thus totalling to (12+38) '50' Angas in all in these 12-DEPs. Here it is interesting to know that there are '50' Drutas only in all these '25' prastaras. It may also be noted that in these 12-DEPs there are '2' Plutas, according to the total (1+1=2) of the 6th proxy '1' and its corresponding lower figure '1' of Mahapatala, '6' Gurus, according to the total (2+4=6) of the 4th proxy '2' and its corresponding lower figure '4' of Mahapatala, '18' Laghus, according to the total (5+13=18) of the 2nd proxy '5' and its corresponding lower figure '13' of Mahapatala and '12' Drutas, according to the total (4+8=12) of the lowest 1st proxy '4' and its corresponding lower figure '8' of Mahapatala thus striking the total (12D+2P+6G+18L+12D) to '50' Angas.

(b) As per the 2nd LEP-proxy '9' and its corresponding lower figure '33' of Mahapatala, it should be

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understood that apart from the '9' Laghus which are in the extreme right end of these prastaras, there are '33' other Angas also thus totalling to (9+33) '42' Angas in all these 9-LEPs. Here it is interesting to know that there are only '42' Laghus in all these '25' prastaras. It may also be noted that in these 9-LEPs there are '3' Gurus, according to the total (1+2=3) of the 4th proxy '1' and its corresponding lower figure '2' of Mahapatala, '12' Laghus, according to the total (3+9=12) of the 2nd proxy '3' and its corresponding lower figure '9' of Mahapatala and '18' Drutas, according to the total (5+13=18) of the lower 1st proxy '5' and its corresponding lower figure '13' of Mahapatala thus striking the total (9L+3G+12L+18D) to '42' Angas.

(c) As per the 4th GEP-proxy '3' and its corresponding lower figure '9' of Mahapatala, it should be understood that apart from the '3' Gurus which are in the extreme right end of these prastaras, there are '9' other Angas also thus totalling to 3(+9) '12' Angas in all these 3-GEPs. Here it is interesting to know that there are '12' Gurus only in all these '25' prastaras. It may also be noted that in these 3-GEPs there are '3' Laghus, according to the total (1+2=3) of the 2nd LEP -proxy '1' and its corresponding lower figure '2' of Mahapatala, and '3' Drutas, according to the total (2+4=6) of the lower 1st proxy '2' and its corresponding lower figure '4' of Mahapatala thus striking the total 3G+3L+6D) to '12' Angas.

(d) As per the 6th PEP-proxy '1' and its corresponding lower figure '2' of Mahapatala, it should be understood that apart from the '1' Pluta which is in the extreme right end of this prastara, there are '2' other Angas also thus totalling to (1+2) '3' Angas in all in these permutations. Here it is interesting to know that there are only '3' Plutas in all the '25' prastaras. It may also be noted that in this 1-PEP there is one Pluta, according to the 6th PEP-proxy '1' and '2' Drutas, according to the total (1+1=2) of the

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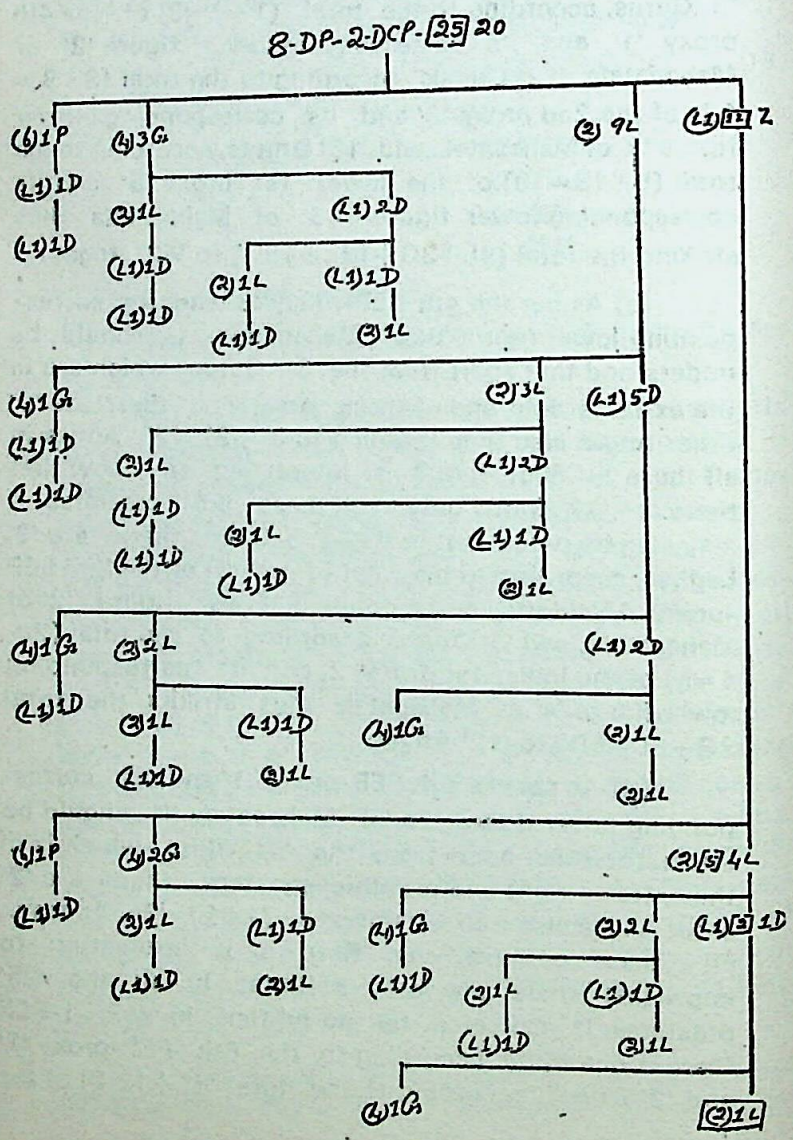
lowest 1st proxy '1' and its corresponding lower figure '1' of Mahapatala thus striking the total (1P+2D) to '3' Angas.

Explanatory diagram of 2-DCP of 8-DP (Khanda-prastara) of Kalita



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For an easy understanding of the above explanation a diagram and a table have also been furnished. In addition, another similar diagram and a table consisting of the inner details have also been furnished pertaining to this question concerned to obtain the answer.

In the same manner the question of 'Kalita' should be answered for all the other modes of permutation.

Explanatory table of 2-DCP of 8-DP (Khanda-prastara) of Kalita

S (8)	K (6)	P (4)	G (2)	L (1)	D	M
1	-	1	-	-	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
1	-	1	-	-	2	3
3	-	-	3	-	-	3
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	-	2	2
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	1	-	1
3	-	-	3	3	6	12

S (8)	K (6)	P (4)	G (2)	L (1)	D	M
9	-	-	-	9	-	9
	-	-	1	-	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	3	-	1
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	-	2	2
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	1	-	1
	-	-	-	-	5	5
	-	-	1	-	-	1
	-	-	-	-	1	1
	-	-	-	2	-	2
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	1	-	1
	-	-	-	-	2	2
	-	-	1	-	-	1
	-	-	-	1	-	1
	-	-	-	1	-	1
9	-	-	3	21	18	42

S (8)	K (6)	P (4)	G (2)	L (1)	D	M
7	-	-	-	-	7	7
	-	1	-	-	-	1
	-	-	-	-	1	1
	-	-	2	-	-	2
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	1	-	1
	-	-	-	4	-	4
	-	-	1	-	-	1
	-	-	-	-	1	1
	-	-	-	2	-	2
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	-	-	1	1
	-	-	-	1	-	1
	-	-	-	-	1	1
	-	-	1	-	-	1
7	-	1	4	10	14	29
20	-	2	10	34	40	86

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Chapter-5
Very Important Clues Of Prastara

To understand easily and remember the vital points of this element, Prastara, some important clues have been prescribed hereunder.

5.1. SANKHYA & PROXIES

In obtaining the full details of any mode of permutation its proxies. which are the figures of the preceding houses, play a very important role.

In Panchanga-prastara, in which only five Angas are used in the process of permutation, the 1st, 2nd, 4th, 6th and 8th proxies represent the five Angas namely, Druta, Laghu, Guru, Pluta and Kakapada respectively. As such the total of the existing proxies of these preceding houses constitute 'Sankhya', the total number of prastaras obtained in the process of permutation.

In the same manner, in Shadanga-prastara, in which all the six Angas are used in the process of permutation each Jati consists of six proxies representing the six Angas namely, Anudruta, Druta, Laghu, Guru, Pluta and Kakapada respectively and they are :

1 – 2–3– 6– 9–12– for Trisra-Jati of 3-units,
1 – 2–4– 8– 12–16– for Chaturashra-Jati of 4-units,
1 – 2–5– 10– 15–20– for Khanda-Jati of 5-units,
1 – 2–7– 14– 21–28– for Mishra-Jati of 7-units, and
1 – 2–9– 18– 27–36– for Sankeerna–Jati of 9-units

———as such the total of the existing respective proxies of these above respective preceding houses constitute the respective 'Sankhya'.

In Samyuktanga-prastara the figures of all the preceding houses are the proxies and the total of all of them comprise 'Sankhya'.

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It could easily be understood that among all these proxies the 1st and 2nd proxies are common to all modes of permutation whereas in respect of the remaining proxies, while Panchanga-prastara has multiples of '2', Shadanga-prastara has the multiples of the respective Jati-number i.e., multiples of '3' for Trisra-Jati, multiples of '4' for Chaturashra-Jati, multiples of '5' for Khanda-Jati, multiples of '7' for Mishra-Jati and multiples of '9' for Sankeerna-Jati, Samyuktanga-prastara has, fully (O), all the numbers serially and consecutively, and it could also be understood that these proxy numbers are the numbers of the houses of independent Talangas which are instituted into the process of permutation.

In this connection it may be interesting to note that the respective proxy-figures are the total numbers of prastara consisting the respective Angas in the extreme right end of each prastara. For example, in 8-DP which begins with Kakapada the 1st, 2nd, 4th, 6th and 8th proxies are 33, 19, 6, 2 and 1 respectively and they are the total numbers of prastaras consisting Druta, Laghu, Guru, Pluta and Kakapada respectively in the extreme right end as such the total of all the respective proxies constitute 'Sankhya' of a particular prastara.

For the 'Table of Combinative Angas' with the respective proxies of the same vertical line, the corresponding IAEP- figures of the specified upper horizontal lines should also be written for the vertical lines consisting combinations of two Angas, and along with the respective proxies of the same vertical line the corresponding serial figures of other vertical lines, pertaining to the interbred combinations, should also be written for the vertical lines pertaining to the combinations of three Angas or more.

In respect of Khanda-prastara, it should be understood that, as the lowest line of any table of any Anga always consists of only the devoid permutations of that particular Anga the proxy of that par-

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ticular Anga should be omitted while taking the respective proxies into account for the lowest-line and for all the upper-lines of the same table this above omitted number of proxy should be taken from the immediate lower-line along with all the other respective proxies of the same line. For example, in Panchanga-prastara as the 1st, 2nd, 4th, 6th and 8th proxies represent Druta, Laghu, Guru, Pluta and Kakapada respectively, the 1st proxy for Druta-meru, the 2nd proxy for Laghu-meru, the 4th proxy for Guru-meru, the 6th proxy for Pluta-meru and the 8th proxy proxy for Kakapada-meru, thus the respective proxy of tha table, should be omitted while taking the respective proxies of the respective lowest-lines into account and the same number of proxy should be taken into account from the immediate lower-line for all the respective upper - lines.

IMPORTANT NOTE :- In order to obtain the the corresponding serial number from Anuloma-serial-number to Viloma-serial-number or vice-versa of Sankhya, subtract the question-number of the prastara from the respective and Sankhya and add figure '1' to it.

5. 2. MAHAPATALA :-

In any table, each and every figure of 'Sankhya' is the combination of the existing proxies which represent different prastaras obtained in the process of permutation. In the same manner the figure mentioned beneath 'Sankhya' is 'Mahapatala' which repesents the total number of all the different Angas or figures obtained in the process of permutation. For writingthe figures of 'Mahapatala' for all the other tables than the 'Table of Combinative Angas', the total of the existing respective proxies along with their respective figures of 'Maha patala' should be written, but for the 'Table of Combinative Angas', in addition to the existing respective proxies and their respective figures of 'Mahapatala' of the samevertical line, the corresponding IAEP - figures of specific upper-horizontal-lines and a specific 'Interval-

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Table of thes eries of combinative Angas or figures

S.No		2		3	4	5	7	9		3	4	5	7	9	S.No
1	0	1	U	1	1	1	1	1	01+	17	22	27	37	47	33
2	1	2	0	2	2	2	2	2	U0S$\dot{S}$	18	23	28	38	48	34
3	01	3	U0	3	3	3	3	3	U01+	,,	,,	,,	,,	,,	35
4	S	4	1	,,	4	5	7	9	1S$\dot{S}$	,,	24	30	42	54	36
5	0S	5	U1	4	5	6	8	10	S+	,,	,,	,,	,,	,,	37
6	1S	6	01	5	6	7	9	11	U1S$\dot{S}$	19	25	31	43	55	38
7	$\dot{S}$	,,	U01	6	7	8	10	12	US+	,,	,,	,,	,,	,,	39
8	01S	7	S	,,	8	10	14	18	01S$\dot{S}$	20	26	32	44	56	40
9	0$\dot{S}$	,,	US	7	9	11	15	19	0S+	,,	,,	,,	,,	,,	41
10	1$\dot{S}$	8	0S	8	10	12	16	20	U01S$\dot{S}$	21	27	33	45	57	42
11	+	,,	U0S	9	11	13	17	21	U0S+	,,	,,	,,	,,	,,	43
12	01$\dot{S}$	9	1S	,,	12	15	21	27	1S+	,,	28	35	49	63	44
13	0+	,,	$\dot{S}$	,,	,,	,,	,,	,,	$\dot{S}$+	,,	,,	,,	,,	,,	45
14	S$\dot{S}$	10	U1S	10	13	16	22	28	U1S+	22	29	36	50	64	46
15	1+	,,	U$\dot{S}$	,,	,,	,,	,,	,,	U$\dot{S}$+	,,	,,	,,	,,	,,	47
16	0S$\dot{S}$	11	01S	11	14	17	23	29	01S+	23	30	37	51	65	48
17	01+	,,	0$\dot{S}$	,,	,,	,,	,,	,,	0$\dot{S}$+	,,	,,	,,	,,	,,	49
18	1S$\dot{S}$	12	U01S	12	15	18	24	30	U01S+	24	31	38	52	66	50
19	S+	,,	U0$\dot{S}$	,,	,,	,,	,,	,,	U0$\dot{S}$+	,,	,,	,,	,,	,,	51
20	01S$\dot{S}$	13	1$\dot{S}$	,,	16	20	28	36	1$\dot{S}$+	,,	32	40	56	72	52
21	0S+	,,	+	,,	,,	,,	,,	,,	U1$\dot{S}$+	25	33	41	57	73	53
22	1S+	14	U1$\dot{S}$	13	17	21	29	37	01$\dot{S}$+	26	34	42	58	74	54
23	$\dot{S}$+	,,	U+	,,	,,	,,	,,	,,	U01$\dot{S}$+	27	35	43	59	75	55
24	01S+	15	01$\dot{S}$	14	18	22	30	38	S$\dot{S}$+	,,	36	45	63	81	56
25	0$\dot{S}$+	,,	0+	,,	,,	,,	,,	,,	US$\dot{S}$+	28	37	46	64	82	57
26	1$\dot{S}$+	16	U01$\dot{S}$	15	19	23	31	39	0S$\dot{S}$+	29	38	47	65	83	58
27	01$\dot{S}$+	17	U0+	,,	,,	,,	,,	,,	U0S$\dot{S}$+	30	39	48	66	84	59
28	S$\dot{S}$+	18	S$\dot{S}$	,,	20	25	35	45	1S$\dot{S}$+	,,	40	50	70	90	60
29	0S$\dot{S}$+	19	1+	,,	,,	,,	,,	,,	U1S$\dot{S}$+	31	41	51	71	91	61
30	1S$\dot{S}$+	20	US$\dot{S}$	16	21	26	36	46	01S$\dot{S}$+	32	42	52	72	92	62
31	01S$\dot{S}$+	21	U1+	,,	,,	,,	,,	,,	U01S$\dot{S}$+	33	43	53	73	93	63
32			0S$\dot{S}$	17	22	27	37	47							

Contd.

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1	1	24	8	47	4-7
2	2	25	1-8	48	1-3-7
3	1-2	26	2-7	49	5-6
4	3	27	3-6	50	1-4-6
5	1-3	28	1-2-6	51	2-3-6
6	4	29	4-5	52	2-4-5
7	1-4	30	1-3-5	53	1-2-3-5
8	2-3	31	2-3-4	54	11
9	5	32	9	55	1-11
10	1-5	33	1-9	56	2-10
11	2-4	34	2-8	57	3-9
12	1-2-3	35	3-7	58	1-2-9
13	6	36	1-2-7	59	4-8
14	1-6	37	4-6	60	1-3-8
15	2-5	38	1-3-6	61	5-7
16	3-4	39	1-4-5	62	1-4-7
17	1-2-4	40	2-3-5	63	2-3-7
18	7	41	1-2-3-4	64	1-5-6
19	1-7	42	10	65	2-4-6
20	2-6	43	1-10	66	1-2-3-6
21	3-5	44	2-9	67	3-4-5
22	1-2-5	45	3-8	68	1-2-4-5
23	1-3-4	46	1-2-8	69	12

unit- figure' should also be included and written for the lines pertaining to the combinations of three or more Angas, in addition to the existing respective proxies and the figures of their respective 'Mahapatala' of the same vertical line, the corresponding serial figures and the figures of their respective 'Mahapatala', pertaining to the interbred combinations of their vertical lines, should also be included and written.

The different interberd combinations have been furnished in the above 'Table of the series of combinative Angas or figures'. In this table, in the list of Shadanga-prastara, for only Trisra-Jati the 27th ADK-line becomes

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28th line, the 28th GP-line becomes 27th line, the 35th ADLK- line becomes 36th line and the 36th LGP-line becomes 35th line.

In the process of Panchanga-prastara wherein only five Angas namely, Druta, Laghu, Guru, Pluta and Kakapada are used, only '31' kinds of interbred combinations of these five Angas derive upon mathematical basis and a careful observation of these combinations reveals that there are :

Druta–ending–combination–s		... 1
Laghu	—do—	... 2
Guru	—do—	... 4
Pluta	—do—	... 8
Kakapada	—do—	... 16

...thus the number becomes doubled starting from figure '1'.

In Shadanga-prastara, wherein the six Angas namely, Anudruta, Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation, only '63' kinds of interbred combinations of these six Angas derive upon mathematical basis and a careful observation of these combinations reveals that there are :

Anudruta-ending-combination–s		... 1
Druta	—do—	... 2
Laghu	—do—	... 4
Guru	—do—	... 8
Pluta	—do—	... 16
Kakapada	—do—	... 32

...thus the number becomes doubled starting from figure '1'.

In Samyuktanga-prastara, wherein independent and synaptic-Angas of all the units are used serially in ascending order of value the full details have not been furnished as the total number of combinations always vary according to the requirement of units of permutations. However, it could be understood that there are

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only '69' interbred combinations in the permutation of 12-units and there are :

1-unit-ending-combination-s	...	1
2	—do—	... 2
3	—do—	... 4
4	—do—	... 8
5	—do—	...13
6	—do—	... 13
7	—do—	... 10
8	—do—	... 7
9	—do—	... 5
10	—do -	... 3
11	—do—	... 2
12	— do—	... 1

While writing the figures of the 'Table of combinative Angas', for the lines pertaining to the combinations of two Angas or figures the following method should be adopted to obtain the figure of 'Interval-units' and also the 'Specified - number of the upper - horizontal - lines'.

5. 2. 1. FIGURE OF 'INTERVAL - UNITS'

In Panchanga-prastara, wherein only five Angas namely, Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation there are, in total, 10 kinds of combinations consisting of two different Angas according to the 'Table of the series of combinative Angas and figures.' Among them the first four combinations, DL, DG, DP and DK along with their respective proxies and ratio are 1/2=1:2, 1/4=1:4, 1/6=1:6 and 1/8=1:8 respectively, the next three combinations, LG, LP, and LK along with their respective proxies and ratio are 2/4=1:2, 2/6=1:3 and 2/8=1:4 respectively, the next two combinations, GP and GK

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along with their respective proxies and ratio are 4/6 (FN)=1:2 and 4/8=1:2 respectively and the last combination, PK along with its respective proxies and ratio is 6/8 (FN)=1:2.

In Shadanga-prastara, wherein all the six Angas namely, Anudruta, Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation there are, in total, 15 kinds of combinations consisting of two different Angas. Among them :

— the first six combinations, AD, AL, AG, AP and AK consisting of the same figures representing for both their proxies and ratio are :

1:2, 1:3, 1:6, 1:9 & 1:12 in Trisra jati,
1:2, 1:4, 1:8, 1:12 & 1:16 in Chaturashra-jati,
1:2, 1:5, 1:10, 1:15 & 1:20 in Khanda-jati,
1:2, 1:7, 1:14, 1:21 & 1:28 in Mishra-jati and
1:2, 1:9, 1:18, 1:27 & 1:36 in Sankeerna-jati respectively,

— the next four combinations, DL, DG, DP and DK along with their respective proxies and ratio are ;
2/3[FN]=1 : 2, 2/6=1 : 3, 2/9 [FN] = 1:5 & 2/12= 1 : 6 in Trisra-jati,

2/4=1 : 2, 2/8=1 : 4, 2/12=1 : 6 & 2/16= 1: 8 in Chaturashra-jati,

2/5[FN]=1 : 3, 2/10=1 : 5, 2/15[FN]=1 : 8 & 2/20= 1 : 10 in Khanda-jati,

2/7[FN]=1 : 4, 2/14=1 : 7, 2/21[FN]=1 : 11 & 2/28 =1 : 14 in Mishra-jati and

2/9[FN]=1 : 5, 2/18=1 : 9, 2/27[FN]=1 : 14 & 2/36 =1 : 18 in Sankeerna-jati respectively,

——the next three combinations, LG, LP and LK along with their respective proxies and ratio are :

3/6=1 : 2, 3/9=1 : 3 & 3/12=1 : 4 in Trisra-jati,
4/8=1 : 2, 4/12= 1 : 3 & 4/16=1 : 4 in Chaturashra-jati,

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5/10=1 : 2, 5/15=1 : 3 & 5/20=1 :4 in Khanda-jati, 7/14=1 : 2, 7/21= 1 : 3 & 7/28=1 : 4 in Mishra-jati and

9/18=1 : 2, 9/27=1 : 3 & 9/36=1 : 4 in Sankeerna-jati respectively,

—— the next two combinations, GP and GK along with their respective proxies and ratio are :

6/9 [FN]=1 : 2 & 6/12= 1 : 2 in Trisra-jati,

8/12[FN]=1 : 2 & 8/16=1 : 2 in Chaturashra-jati,

10/15[FN]= 1 : 2 & 10/20=1 : 2 in Khanda-jati,

14/21[FN]=1 : 2 & 14/28=1 : 2 in Mishra-jati and

18/27[FN]=1 : 2 & 18/36=1 : 2 in Sankeerna-jati respectively and

——the last one combination, PK along with its proxies and ratio is :

9/12[FN]=1 : 2 in Trisra jati, 12/16[FN]=1 : 2 in Chaturashra-jati, 15/20[FN]=1 : 2 in Khanda-jati, 21/28 [FN]=1 : 2 in Mishra-jati and 27/36[FN]=1 : 2 in Sankeerna-jati respectively.

In Samyuktanga-prastara, wherein Angas or figures of all numbers of units are used in serial order in the process of permutation and in which the total number of permutations vary according to the requirement of units of permutation, for example, in the permutation of 12-units there are 30 kinds of combinations consisting of two Angas or figures of different units. Among them :

——the first ten comibinations consisting of the same figures representing for both their respective proxies and ratio are :

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1 :2, 1 : 3, 1 : 4, 1 : 5, 1 : 6, 1 : 7, 1 : 8, 1 : 9, 1 : 10, & 1 : 11,

——the next eight combinations, 2–3, 2–4, 2–5, 2–6, 2–7, 2–8, 2–9 and 2–10 along with their respective proxies and ratio are :

2/3 (FN) = 1 : 2, 2/4 = 1 : 2, 2/5 (FN) = 1 : 3, 2/6 = 1 :3 2/7(FN) = 1 : 4, 2/8 = 1 : 4, 2/9 (FN) = 1 : 5, and 2/10 =1 : 5 respectively.

—— the next six combinations, 3–4, 3–5, 3–6, 3–7, 3–8 and 3–9 along with their respective proxies and ratio are :

3/4 (FN) = 1 : 2, 3/5(FN) = 1 : 2, 3/6 = 1 : 2, 3/7(FN) = 1 : 3, 3/8(FN) = 1 : 3 and 3/9 = 1 : 3 respectively,

—— the next four combinations, 4–5, 4–6, 4–7 and 4–8 along with their respective proxies and ratio are :

4/5(FN) = 1 : 2, 4/6(FN) = 1 : 2, 4/7(FN) = 1 : 2, & 4/8 =1 : 2 respectively and

—— the last two combinations, 5–6 & 5–7 along with their respective proxies and ratio are 5/6(FN) = 1 : 2 & 5/7(FN) = 1 : 2 respectively.

Among all the above the 'Fractional-numbers FN)' of the proxies along with their ratio are :

——two combinations of GP and PK consisting of 8/12 =1 : 2 and 12/16 = 1 : 2 respectively pertaining to Chaturashra-jati of both Panchanga and Shadanga-prastaras,

——four combinations of DL, DP, GP & PK pertaining to Shadanga-prastara consisting of :

2/3 = 1 : 2, 2/9 = 1 : 5, 6/9 = 1 : 2 & 9/12 = 1 : 2 in Trisra-jati,

2/5 = 1 : 3, 2/15 = 1 : 8, 10/15 = 1 : 2 & 15/20 = 1 : 2 in Khanda-jati,

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Table of certain particulars pertaining to the combinations of Angas or figures

2					3					4					5					7					9					0					0				
a	b	c	d	e	a	b	c	d	e	b	c	d	e		b	c	d	e		b	c	d	e		b	c	d	e		a	b	c	d	e	a	b	c	d	e
01	1	1	0	+1	U0	1	1	0	+1	1	1	0	+1		1	1	0	+1		1	1	0	+1		1	1	0	+1		2^{-2}	1	1	0	+1	2^{-8}	2	2	-2	-1
0S	1	1	-2	-1	U1	1	1	-1	0	1	1	-2	-1		1	1	-3	-2		1	1	-5	-4		1	1	-7	-6		2^{-3}	1	1	-1	0	2^{-9}	1	2	-3	-2
0ś	1	1	-4	-3	US	1	1	-2	-3	1	1	-6	-5		1	1	-8	-7		1	1	-12	-11		1	1	-16	-15		2^{-4}	1	1	-2	-1	2^{-10}	2	2	-3	-2
0+	1	1	-6	-5	Uś	1	1	-3	-6	1	1	-10	-9		1	1	-13	-12		1	1	-19	-18		1	1	-25	-24		2^{-5}	1	1	-3	-2	3^{-11}	1	3	0	+1
1S	2	2	0	+1	U+	1	1	-10	-9	1	1	-14	-13		1	1	-18	-17		1	1	-26	-25		1	1	-34	-33		2^{-6}	1	1	-4	-3	3^{-5}	1	3	0	+1
1ś	2	2	-1	0	01	1	2	0	+1	2	2	0	+1		1	2	-1	0		1	2	-2	-1		1	2	-3	-2		2^{-7}	1	1	-5	-4	3^{-6}	3	3	0	+1
1+	2	2	-2	-1	0S	2	2	-1	0	2	2	-2	-1		2	2	-3	-2		2	2	-5	-4		2	2	-8	-7		2^{-8}	1	1	-6	-5	3^{-7}	1	3	-1	0
Sś	2	4	0	+1	0ś	1	2	-3	-2	2	2	-4	-3		1	2	-6	-5		1	2	-9	-8		1	2	-12	-11		2^{-9}	1	1	-7	-6	3^{-8}	1	3	-1	0
S+	4	4	0	+1	0+	2	2	-2	-3	2	2	-6	-5		2	2	-8	-7		2	2	-12	-11		2	2	-16	-15		2^{-10}	1	1	-8	-7	3^{-9}	3	3	-1	0
ś+	2	6	0	+1	1S	3	3	-3	+1	4	4	0	+1		5	5	-1	0		7	7	-2	-1		9	9	-3	-2		2^{-11}	1	1	-9	-8	4^{-5}	1	4	0	+1
					1ś	3	3	-1	0	4	4	-1	0		5	5	-2	-1		7	7	-4	-3		9	9	-5	-4		2^{-12}	1	2	0	+1	4^{-6}	1	4	0	+1
					1+	3	3	-2	-1	4	4	-2	-1		5	5	-3	-2		7	7	-5	-4		9	9	-7	-6		2^{-14}	2	2	0	+1	4^{-7}	1	4	0	+1
					Sś	3	6	-3	+1	4	8	0	+1		5	10	0	+1		7	14	0	+1		9	18	0	+1		2^{-15}	1	2	-1	0	4^{-8}	4	4	0	+1
					S+	6	6	-3	+1	8	8	0	+1		10	10	0	+1		14	14	0	+1		18	18	0	+1		2^{-16}	2	2	-1	0	5^{-6}	1	5	0	+1
					ś+	3	9	-3	+1	4	12	0	+1		5	15	0	+1		7	21	0	+1		9	27	0	+1		2^{-17}	1	2	-2	-1	5^{-7}	1	5	0	+1

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2/7 = 1 : 4, 2/21 = 1 : 11, 14/21 = 1 : 2 & 21/28 = 1 : 2 in Mishra-jati and

2/9 = 1 : 5, 2/27 = 1 : 14, 18/27 = 1 : 2 & 27/36 = 1 : 2 in Sankeerna-jati respectively and

——thirteen combinations pertaining to 12-units permutation of Samyuktanga-prastara consisting of :

2/3 = 1 : 2, 2/5 = 1 : 3, 2/7 = 1 : 4, 2/9 = 1 : 5, 3/4 = 1 : 2, 3/5 = 1 : 2, 3/7 = 1 : 3, 3/8 = 1 : 3, 4/5 = 1 : 2, 4/6 = 1 : 2, 4/7 = 1 : 2, 5/6 = 1 : 2 & 5/7 = 1 : 2.

5.2.2. KEY-RULES FOR OBTAINING THE 'SPECIFIED-NUMBERS' OF THE UPPER-HORIZONTAL-LINES FOR TAKING 'MAHAPATALA' OF IAEPS INTO ACCOUNT

(See the 'Table of certain particulars pertaining to the combinations of two Angas or figures - - - (a) Combination of two Angas or figures (b) Specified-number of the upper-horizontal-line pertaining to the figure of IAEP of lower Anga (c) Specified-number of the upper-horizontal-line pertaining to the figure of IAEP of higher Anga (d) Number of the interval-unit to be, in general, added to or subtracted from the total of Mahapatala (e) Number of the Interval-unit to be added to or subtracted from the total of Mahapatala when it is included in the figure of IAEP of higher Anga).

Always the proxy of the lower Anga of the combination of two Angas or figures becomes the 'Specified-number' of fhe upper-horizontal line for both lower and higher Angas or figures from which 'Mahapatala' of IAEPs should be taken into account. But for 'Fractional-numbers' of proxies, in respect of IAEPs of ONLY lower Anga or figure, the proxy of the least Anga or figure of that particular mode of permutation itself becomes the 'Specified-number' of the upper-horizontal- line.

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5.3. NASHTA

(a) While answering the question of Akhanda-anuloma-nashta of all modes of permutation, after subtracting the question-number from the total number of permutations, the concerned proxies should only be subtracted consecutively from the remaindar. If the first proxy could not be subtracted from the remainder write the Anga or figure of the same proxy. If the first proxy could be subtracted from the remainder the second consecutive Anga or figure should be written and its proxy i. e., second proxy, should be left-off, but, if this proxy i. e., second proxy could also consecutively be subtracted, the third consecutive Anga or figure, should, in total, be written and its proxy i. e., third proxy, should be left-off. In the same manner the process should be continued consecutively subtracting more number of proxies and writing the next consecutive Anga or figure of the last subtracted proxy and leaving away its proxy.

NOTE : No proxy should ever be left-off after obtaining the lowest Anga or figure as the lowest Anga or figure is derived only when the first proxy could not be subtracted.

(b) In all modes of permutation while answering the question of Khanda-anuloma-nashta for the upper-lines of the very first table, if the subtraction continues upto the lowest-line and a proxy of that line could not be subtracted, the least Anga or figure, at the first instance, be written and then further Angas or figures be written as per rules governing the lowest-line. But, in respect of all the other tables than this very first table, if this subtraction continues upto the lowest-line and a proxy of that line could not be subtracted, then, without writing any Anga or figure as in the very first table, further Angas or figures be written as per the rules governing the lowest-lines.

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(c) In all modes of permutation, for Akhanda-anuloma-nashta, to fill-in the deficit value of the prastara the least Anga or figure of that particular mode should always be written.

In all modes of permutation, for Khanda-anuloma-nashta, for all the tables of Angas or figures, except for the first tables of the least Anga or figure, the least Anga or figure of that particular mode of permutation should always be written for the lowest-lines and for the upper-lines either or both the least Anga or figure of that particular mode of permutation and the Anga or figure of that particular table should always be written. But, in respect of the first tables of the least Angas or figures the following method should be followed :

(i) In respect of the first table of the least Anga, Druta-meru of Panchanga-prastara either or both Druta and Laghu should be written for the upper-lines and for the lowest-line, among the above two Angas Druta should always be avoided as the lowest-line of this table consists of DDPs (Druta-devoid-permutations) only.

(ii) In respect of the first table of the least Anga, Anudruta-meru of Shadanga-prastara, either or any two or all the Angas of Anudruta, Druta and Laghu should be written for the upper-lines and for the lowest-line, among the above three Angas Anudruta should always be avoided as the lowest-line of this table consists of ADPs (Anudruta-devoid-permutations) only.

(iii) In respect of the first table of one-unit of Samyuktanga-prastara, either or any two or all the figures of 1,2 & 3 units should be written for the upper lines and for the lowest-line, among the above three figures, figure of 1-unit should always be avoided as the lowest-line of this table consists of 1-UDPs (One-unit-devoid-permutations) only.

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(d) In respect of Viloma-nashta figure '1' should be subtracted from the question-number and later from the remainder the method of Anuloma-nashta should only be followed.

5.4. UDDISHTA

For answering the question of Anuloma-uddishta the rules governing the respective Anuloma-nashta should only be followed but in reverse order. In respect of Viloma-uddishta the rules governing the same Anuloma-uddishta should be followed but, at last, figure '1' should be added to the SF.

5.5. KALITA

For answering the question of 'Kalita' different diagrams and tables have been furnished in this book to make the process easier.

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Chapter - 6

Relevant Sanskrit Texts of Old Treatises Followed By Free English Translation And Reforms

6.1. SANSKRIT TEXT OF TALAPRASTARA OF SANGEETA RATNAKARA WRITTEN BY NISSHANKA SHARNGADEVA (97 Slokas from 312th to 408th of Taladhyaya)

NOTE : Each foot of each Sloka is divided into two halves and thus the four halves of each Sloka are named as 'A, B, C & D'.

संगीतरत्नाकरः

अन्येऽपि सन्ति भूयांसस्तालास्ते लक्ष्यवर्त्मनि ।
प्रसिद्धिविधुरत्वेन शास्त्रेऽस्मिन्न प्रदर्शिताः ।।1।

तद्भेदप्रत्ययार्थं तु लघूपाया भवन्त्यमी ।
प्रस्तारसंख्ये नष्टं चोद्दिष्टं पातालकस्ततः ।2।

द्रुतमेरुर्लघोर्मेरुर्गुरुमेरुः प्लुतस्य च ।
मेरुः संयोगमेरुश्च खण्डप्रस्तारकस्ततः ।3।

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प्राचां चतुर्णां मेरूणां नष्टोद्दिष्टे पृथक्पृथक् ।
एकोनविंशतिरिति प्रत्ययास्तान् ब्रुवेऽधुना ।4।

न्यस्याल्पमाद्यान्महतोऽधस्ताच्छेषं यथोपरि ।
प्रागूनैं वामसंस्थांस्तु संभवे महतो लिखेत् ।5।

अल्पानसंभवे तालपूर्त्यै भूयोऽप्ययं विधिः ।
सर्वद्रुतावधिः कार्यः प्रस्तारोऽयं लघौ गुरौ ।6।

प्लुते व्यस्ते समस्ते च न तु व्यस्ते द्रुतेऽस्ति सः ।
एकद्व्यङ्कौ क्रमान्न्यस्य युञ्जीतान्त्यं पुरातनैः ।7।

द्वितीयतुर्यषष्ठाङ्कैरभावे तुर्यषष्ठयोः ।
तृतीयपञ्चमाङ्काभ्यां क्रमात्तं योगमग्रतः ।8।

लिखेद्दक्षिणसंस्थैवमङ्कश्रेणी विधीयते ।
सा चाङ्कैरिष्टतालस्थद्रुतसंख्यैः समाप्यते ।9।

द्रुतो लघुः सार्धमात्रो गुरुः सार्धद्विमात्रिकः ।
प्लुतः सार्धत्रिमात्रश्चेत्येकैकद्रुतवर्धितैः ।10।

तालभेदाः क्रमादङ्कैः संख्यायन्ते स्थितैरिह ।
यदङ्कयोगादन्त्योऽङ्को लब्धस्तैरन्ततः क्रमात् ।11।

भेदा द्रुतान्तलघ्वन्तगुर्वन्ताश्च प्लुतान्तकाः ।
संख्यायन्त इति प्रोक्ताः संख्या निःशङ्कसूरिणा ।12।

अत्रैतावतिथो भेदः किंरूप इति पृच्छति ।
यत्र तन्नष्टमाख्यातं तस्योत्तरमिहोच्यतें ।13।

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भेदानां यावतां मध्ये नष्टप्रश्नः कृतो भवेत् ।
तावत्संख्याङ्कपर्यन्तां लिखेत्संख्याङ्कसंततिम् ।14।

अन्त्याङ्के तत्र नष्टाङ्कं पातयेदथ शेषतः ।
पातयेत्पूर्वपूर्वाङ्कं तत्र त्वपतितो द्रुतः ।15।

पूर्वश्चेत्पतितो न स्याल्लघुस्तु पतिताङ्कवेत् ।
उत्तरेणाकृतार्थेन सहितात्तदसंभवे ।16।

अकृतार्थेन पूर्वेण सान्तरे पतिते पृथक् ।
लघुर्निरन्तरे त्वस्मिल्लँघुरेव गुरुर्भवेत् ।17।

गुरुहेतोस्तृतीये तु पतिते गः प्लुती भवेत् ।
अङ्काभावे द्रुता ग्राह्यास्तालपूरणहेतवः ।18।

इति नष्टस्य विज्ञेयमुत्तरं रूपनिर्णयात् ।
ईदृग्रूपोऽत्र कतिधा भेदः प्रश्न इतीदृशः ।19।

उद्दिष्टं तत्र संख्याङ्कसंतर्तिं नष्टवल्लिखेत् ।
यैरङ्कैः पतितैर्नष्टे लभ्यन्ते ये प्लुतादयः ।20।

तानेवाङ्कान्लँभन्ते ते भेदमुद्दिष्टमाश्रिताः ।
यद्वा षट्प्लुतहेत्वङ्कमध्ये ऽन्त्यात्प्राचि सप्तमे ।21।

तदभावे तु षष्ठाङ्के पातितेऽन्त्याङ्कमध्यतः ।
यः शेषः स प्लुताल्लभ्यो लब्धहीनान्त्यशेषतः ।22।

ज्ञानं पूरणसंख्याया उद्दिष्टोत्तरमिष्यते ।
आदौ रूपमथैकैकमङ्कसख्याङ्कसंततेः ।23।

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क्रमादधोऽधो विन्यस्येदन्त्यादींश्चतुरस्तथा ।
स्वपङ्क्तिस्थाँल्लिखेदङ्कानग्रसंख्याङ्कवद्युतान् ।24।

किं तु प्रतिनिधिर्नात्र विद्यते तुर्यषष्ठयोः ।
इष्टतालद्रुतमितेष्वङ्कषु लिखितेष्विति ।25।

क्रमादन्त्योपान्त्यतुर्यषष्ठैर्यत्र द्रुतादयः ।
मीयन्ते सर्वभेदस्थाः पातालः सोऽभिधीयते ।26।

पङ्क्तिं कृत्वेष्टतालस्य द्रुतसंमितकोष्ठिकाम् ।
तिरश्चीं तत्परामूनां कोष्ठेनाथ ततः पराः ।27।

द्विद्विकोष्ठोनिताः स्वस्वपूर्वतोऽथाङ्कयोजना ।
द्वौ द्वौ तासामाद्यकोष्ठौ स्यातामेकाङ्कसंयुतौ ।28।

अधस्तन्यास्तृतीयादौ विषमे कोष्ठके लिखेत् ।
अन्त्याद्यङ्कचतुष्कस्य योगं संख्याङ्कसंभवत् ।29।

समे त्वन्त्यं विनैतेषां योगं न्यस्याथ पङ्क्तिषु ।
परासु शेषकोष्ठेषु चतुर्योगोऽयमिष्यते ।30।

नास्ति प्रतिनिधिस्त्वासामङ्कयोस्तुर्यषष्ठयोः ।
तासु स्वभावतो यास्तु निष्पन्ना ऊर्ध्वपङ्क्तयः ।31।

तन्मध्ये तु समा कोष्ठेऽन्त्यस्थानेऽन्त्यादधस्तनः ।
अङ्कः कार्योऽथ तैरङ्कैर्भेदसंख्याभिधीयते ।32।

विषमायामूर्ध्वपङ्क्तौ स्थितैरङ्कैरधः क्रमात् ।
एकद्रुताद्या विषमत्र्यादिसंख्या द्रुता भिदाः ।33।

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सर्वद्रुतान्ता मीयन्ते समपङ्क्तिस्थितैः पुनः ।
द्रुतहीनादयो द्व्यादिसमसंख्या द्रुता भिदाः ।34।

सर्वद्रुतान्ता ज्ञायन्ते द्रुतमेरुरयं मतः ।
ऊर्ध्वपङ्क्तिस्थसर्वाङ्कयोगात्संख्यापि गम्यते ।35।

लघुमेरौ कोष्ठपङ्क्तीः प्राग्वन्न्यस्येत्तदादिमः ।
एकैककोष्ठ एकाङ्कयुक्तोऽधःपङ्क्तिकेषु तु ।36।

शेषकोष्ठेष्वन्त्यतुर्यषष्ठयोगं निवेशयेत् ।
परासां शेषकोष्ठेषूपान्त्याधस्तनसंयुतम् ।37।

त्रियोगमेवमादध्यादत्र च द्रुतमेरुवत् ।
सदसत्त्वे प्रतिनिधेः कोष्ठाङ्कैरूर्ध्वपङ्क्तिगैः ।38।

लघुहीनादुपक्रम्यैकाद्येकोत्तर वृद्धलाः ।
सर्वलान्ताः क्रमाज्ज्ञेयाः संख्या सर्वाङ्कसंगतेः ।39।

गुरुमेरावधःपङ्क्तेः परा कोष्ठत्रयोनिता ।
चतुश्चतुष्कोष्ठहीनाः स्वस्वपूर्वावलेः पराः ।40।

एकाङ्कवन्त आद्याद्यकोष्ठाः प्रथमपङ्क्तिगः ।
द्वितीयो द्व्यङ्कवानन्त्योपान्त्यषष्ठाङ्कयोगिन ।41।

शेषकोष्ठाः परासां तु द्वितीयादिषु लिख्यते ।
योगोऽन्त्योपान्त्यषष्ठानामधस्तुर्याङ्कसंयुतः ।42।

लघुस्थाने गुरुर्ज्ञेयः शेषं तु लघुमेरुवत् ।
प्लुतमेरावधःपङ्क्तेः पञ्चकोष्ठोनिता परा ।43।

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तत्तराः स्वस्वपूर्वातिः षट्षट्कोष्ठोनिता मताः ।
अधःपङक्तौ तु षष्ठाङ्कस्थाने तुर्यं नियोजयेत् ।44।

त्रियोगोऽयमधः षष्ठयुक्तः स्य त्परपङक्तिषु ।
प्लुतो ज्ञेयो गुरुस्थाने शेषं तु गुरुमेरुवत् ।45।

संयोगमेरावूर्ध्वाः स्युश्चतस्रः कोष्ठपङक्तयः ।
इष्टतालद्रुतमितैः कोष्ठैर्युक्तास्ततः परे ।46।

द्वे पङक्ती स्वस्वपूर्वातो द्विद्विकोष्ठोनिते ततः ।
द्वे षष्ठचा एककोष्ठोने ततस्तिस्रोऽष्टमावलेः ।47।

एककोष्ठोनिताः पश्चाद् द्विद्विकोष्ठोनिते परे ।
पङक्तिभ्यां स्वस्वपूर्वाभ्यां तथैकैकोनिते परे ।48।

आद्यासु चतसृष्वासां क्रमेण सकलद्रुताः ।
समस्तलघवः सर्वगुरवः सकलप्लुताः ।49।

एकाङ्कयुक्तनिःशेषकोष्ठाद्या स्यात्परा पुनः ।
खयुक्तैर्विषमैः कोष्ठैः समैस्त्वेकाङ्कसंयुतैः ।50।

कर्तव्या गुरुपङक्तेस्तु त्रयः कोष्ठा नभोन्विताः ।
तुर्य एकाङ्कवानेवं चतुष्कोष्ठाः परा अपि ।51।

प्लुतपङक्तौ सशून्याः स्युः पञ्च षष्ठस्तु रूपवान् ।
षट्कोष्ठास्तद्वदन्ये स्युः षट्सु पङक्तिष्वनन्तरम् ।52।

द्वियोगजाः क्रमाद्भेदा दलघू दगुरू दपौ ।
लगौ लपौ गपौ चेति तदङ्कप्रक्रिया त्वियम् ।53।

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अत्रोपरिष्टादारभ्य स्यादधोऽधोऽङ्कलेखनम् ।
अन्त्यपूर्वद्वितीयाङ्कतुर्यषष्ठास्तथा क्रमात् ।54।

योज्या दलगपेषु स्युस्तेषु तद्योगजा भिदाः ।
पङ्क्तौ तदङ्कयोगाङ्कं तत्कोष्ठे संभवाँल्लिखेत् ।55।

लेख्यपङ्क्त्युपरिश्रेणी या तिरश्चो तदाश्रिताः ।
अङ्का दलगपानां स्युराद्यपङ्क्तिचतुष्टये ।56।

तेषु प्रस्तुतभेदस्थद्रुतादिव्यक्तिसंश्रितान् ।
अङ्कान्गृह्णीत तेऽप्यन्त्यद्वितीयाद्या द्रुतादिषु ।57।

प्रस्तुतेषु विपर्यस्ताः स्युरङ्कासंभवे तु खम् ।
त्रियोगजाश्च ये भेदाश्चतुर्योगभवश्च यः ।58।

तत्पङ्क्तीनामपि ज्ञेयमेवमेवाङ्कपूरणम् ।
किंतु त्रियोगजे भेदे ये त्रयः स्युर्द्वियोगजाः ।59।

तेषां संनिहिताद्यानां प्रागुक्तोऽङ्कविपर्ययः ।
चतुर्योगे तु चत्वारो ये स्युर्भेदास्त्रियोगजाः ।60।

तदङ्केष्वेव पूर्वोक्तं स्याद्विपर्यासयोजनम् ।
ये चत्वारस्त्रियोगोत्थाश्चतुर्योगोत्थपञ्चमाः ।61।

भेदास्ते पङ्क्तिषु ज्ञेयाः क्रमादन्त्यासु पङ्क्तिषु ।
दलगा दलपाश्चैव दगपा लगपाः क्रमात् ।62।

त्रियोगजाश्चतुर्योगोद्भवा दलगपा इति ।
एष संयोगमेरुः स्यादतो ज्ञेयमथोच्यते ।63।

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तिर्यक्पङ्क्तिस्थकोष्ठाङ्कैस्तैस्तैः सर्वद्रुतादयः ।
ऊर्ध्वपङ्क्तिगता मेयास्तदभावस्तु शून्यतः ।64।

तावद् द्रुतोऽत्र तालः स्यात्पङ्क्तिर्यावत्तिथी तिरः ।
उपरिष्टात्समारभ्य संख्या पङ्क्त्यङ्कसंगतेः ।65।

द्रुतहीनादयो भेदोद्धारा ये मेरुबोधिताः ।
सर्वप्रस्तारवत्तेषां प्रस्तारः किं तु तेषु यः ।66।

द्रुतादिनियमः सोऽत्र न भङ्क्तव्यः प्रयत्नतः ।
संख्यैषा मेरुको'ठाङ्काद्यस्मात्पूर्वोक्तरीतितः ।67।

लभ्यते तत्र नष्टाङ्कं पातयेदथ शेषतः ।
तृतीयपञ्चमोपान्त्यावपाते लभ्यते लघुः ।68।

परो यद्यकृतार्थः स्यात्सह तेनाथ चेद्द्वयौ ।
अकृतार्थौ ततस्ताभ्यां स्वं विनैवैष लभ्यते ।69।

परे कृतार्थे ग्राह्यः स्यादकृतार्थः पुरातनः ।
पतिताद् गुरुलाभः स्यात्सह प्राचा तदा परा ।70।

चतुरङ्को निवर्तेत पतिते पञ्चमेऽप्यथ ।
गुरुः प्लुती भवेत्प्राचा सह चैषा निवर्तते ।71।

रूपाप्तौ प्रापकाङ्केभ्यः शेषेष्वेष पुनर्विधिः ।
गुरुलाभे त्वपाताहैः पञ्चमः शेषतां व्रजेत् ।72।

अङ्काभावे तु गृह्यन्ते लघवस्तालपूर्तये ।
उद्दिष्टे तु गुरोर्लभ्यस्तृतीयोऽन्त्यात्पुरातनः ।73।

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प्राग्वच्चतुर्निवृत्तिः स्यात्तृतीयः पञ्चमस्तथा ।
प्लुताल्लभ्यौ निवृत्तिस्तु षण्णामथ पुनर्विधिः ।74।

लघोरङ्को न लभ्येत निवृत्तिस्त्वङ्कयोर्द्वयोः ।
लब्धाङ्कयोगहीनेऽन्त्ये शेषादुद्दिष्टबोधनम् ।75।

समस्तनष्टवन्नष्टं विषमे कोष्ठके भवेत् ।
द्रुते लब्धे ततः पूर्वैरङ्कैः स्यात्समकोष्ठवत् ।76।

समस्तोद्दिष्टवत्प्रोक्तमुद्दिष्टमिह सूरिभिः ।
द्रुताङ्कानन्तरं कार्यं विधानं समकोष्ठवत् ।77।

कोष्ठे समोर्ध्वपङ्क्तिस्थे परासामधिको भवेत् ।
द्वितीयाधस्तनः पात्यस्तत्र त्वपतिताद् द्रुतः ।78।

पतितात्लघुः पात्यपातानन्तर्येऽल्पो महान्भवेत् ।
रूपपूर्तौ निवर्तन्ते पूर्ववत्स्वीयपङ्क्तिगाः ।79।

अधःसमवदन्यत्स्यान्निवृत्तौ तु पुनर्विधिः ।
यस्मात्स यस्यामूर्ध्वायां पङ्क्तौ सा विषमा यदि ।80।

विधिर्विषमकोष्ठोक्तः समा चेत्तर्ह्ययं मतः ।
विषमोर्ध्वश्रेणिसंस्थे कोष्ठेऽधोविषमोदितः ।81।

यैरङ्कैः परितर्नष्टैलभ्यन्ते ये प्लुतादयः ।
तेभ्य उद्दिष्टसंस्थेभ्यस्तदङ्कावाप्तिरिष्यते ।82।

द्रुतहीनाद्यकोष्ठासु पङ्क्तिषूर्ध्वासु यो लघुः ।
तस्मादुद्दिष्टरूपस्थान्नाङ्कः कश्चिदवाप्यते ।83

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लब्धाङ्कन्यूनितान्त्याङ्कशेषादुद्दिष्टवेदनम् ।
लघुमेरावधःपङ्क्तेर्नष्टाङ्केनान्त्यशेषतः ।84।

पूर्वेषां पात्यमानानामपाते पुर्ववद् द्रुतः ।
पतितात्सह पूर्वाभ्यां परेण च गुरुर्भवेत् ।85।

पतिते वृत्तगुर्वङ्कानन्तरे गः प्लुती भवेत् ।
एवं नष्टस्य बोधः स्यादित्युक्तं सूरिशार्ङ्गणा ।86।

नष्टे तु परपङ्क्तीनां पातयेत्प्रातिलोम्यतः ।
द्वितीयं च तृतीयाधस्तनमङ्कं च पञ्चमम् ।87।

परेषु च निवृत्तेषु शेषेष्वेष पुनर्विधिः ।
समस्तनष्टवच्चात्र द्रुतादेः प्राप्तिरिष्यते ।88।

किंतु लब्धे लघौ शेषेष्वाद्याधस्तनतः क्रिया ।
सोऽधस्तनः स्वपङ्क्तिस्थविधिमेवं प्रवर्तयेत् ।89।

शेषेऽङ्काश्रितपङ्क्त्यङ्काभावे तु लघवो मताः ।
अधस्तनश्रेणिसंख्या नष्टस्यैष विधिः स्मृतः ।90।

गुरुमेरोरधःपङ्क्तौ नष्टं सकलनष्टवत् ।
प्लुतलाभस्तु गुरुवत्, परपङ्क्तिष्वथोच्यते ।91।

तृतीयाधस्तनस्थाने तृतीयोऽङ्कोऽत्र पात्यते ।
स्थाने तु पञ्चमस्याधः पञ्चमो लघुवद्गुरौ ।92।

लब्धेऽधोव्रजनं शेषाल्लघुवद्गुरुलम्भनम् ।
लघुमेरुवदन्यत्तु नष्टे स्यात्परपङ्क्तिषु ।93।

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समस्तनष्टवन्नष्टं प्लुतमेरावुदाहृतम् ।
विशेषः कथ्यते त्वेष द्वितीयादिषु पङ्क्तिषु ।94।

अधो गच्छेत् प्लुते पूर्णे गुरुमेरौ गुराविव ।
द्रुतो लघुर्गुरुर्वान्त्यैरङ्कैर्लब्धः प्लुती भवेत् ।95।

तदङ्काधस्तनैः सार्धमङ्कषट्कमतीत्य च ।
अधःपङ्क्तौ स्थितैरङ्कैः शेषेरेष पुनर्विधिः ।96।

पङ्क्तौ तु प्लुतहीनायां नान्तिमः प्लुततां व्रजेत् ।
सर्वोद्दिष्टवदुद्दिष्टं लघुमेर्वादिषु त्रिषु ।97।

6.1.1. FREE ENGLISH TRANSLATION

1–4 : In practical music there are many other Talas. As they are not in vogue they have not been described in this Shastra. These are the easy methods to know their varieties of those Talas. They are nineteen : Prastara, Sankhya, Nashta, Uddishta, Patala, Druta-meru, Laghu-meru, Guru-meru and Pluta-meru, Samyoga-meru, Khanda-prastara, Nashta and Uddishta of the four-merus. I shall, now, define them.

1. PRASTARA

5 – 7B : Place the lower (anga) below the higher (anga). Write the remaining in the same way. If the Tala-units are lesser than the previous and if the lower angas are suitable, write them to the left. If not, to fill-in the Tala, write lower angas. This should be done till all become Drutas. This is the permutation in regard to Laghu, Guru and Pluta and their mutual combinations but not for Druta.

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2. SANKHYA

7C – 12 : Write figures 1 & 2 consecutively. Add the previous (ultimate), previous second (penultimate), fourth and sixth. If fourth and sixth are absent add the 3rd and 5th (pratinidhi) instead. Write the total figures continuously to the right. This (series) ends with the (number of) Drutas (equivalent in total duration) of the required Tala. The series should proceed by gradually increasing by one Druta : eg., Druta, Laghu, Matra and a half, Guru, two Matras and a half, Pluta, three Matras and a half. The varieties of Talas are enumerated by these figures of Sankhya. Among the figures which add upto the total figure of Tala varieties (Sankhya), those figures reckoned serially from the right give the number of Talas ending in Druta (DEP), Laghu (LEP), Guru (GEP), and Pluta (PEP) respectively

3. NASHTA

13 – 19B : If it is asked : 'what form does Tala bearing a particular number (in the prastara scheme) consist?'– the answer is given by Nashta ; (this is determined) by writing the series of figures of Sankhya, upto the number of Drutas which are equivalent to the quantity of the Tala. The Nashta-number is subtracted from the final figure ; from the remainder, subtract the preceding figures. If not subtractable, write Druta; if the figure is not thus subtractable but subtracted either along with the un-deducted figure on the right or on the left, write Laghu. If subtracted alternatively or discontinuously write Laghus seperately. If subtracted consecutively, this Laghu becomes Guru. If the third from the figure giving out Guru is also subtracted, this Guru becomes Pluta. In the absence of subtractable numbers fill-in the deficit of the Tala amount by writing the appropriate number of Drutas. Thus the form of the desired Tala is known

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3. UDDISHTA

19C — 23B : Whatever the Pluta (-ending Talas) etc , are obtained by subtracting whatever figures the self-same figures give the Uddishta (forms) also. For example, the serial number of the Uddishta (desired) Tala is as the remainder obtained when from the final figure the penultimate, the seventh or in its absence, the sixth figure are deducted.

4. PATALA

23C — 26 : First write '1' in the first house, below Sankhya, and other figures one after the other in the later houses. Write the upper figure of the previous figure including the last four figures beginning with the last in the present line. The difference (from Uddishta) is, in this case the pratinidhis 3rd & 5th, should not be taken if the 4th & 6th figures are absent. Like this the figures should be written upto the total number of Drutas equal to the quantity of the Tala and in this process the total of the ultimate, penultimate, fourth and sixth is written; it is called Patala.

5. DRUTA-MERU

27 — 35 : Write houses horizontally upto the number of Drutas equal in quantity to the required Tala. Above it write another horizontal line with one house less. Then write further upper lines each with two houses lesser than its predecessor. In the houses prepared in the above manner, write figures as mentioned below. In the first two houses of all these lines write the figure '1'. In the odd-numbered houses of the lowest-line write the total of the four figures viz., ultimate etc., as in the Sankhya and in the even-numbered houses write the total omitting the ultimate. In the remaining houses of the upper-lines the total of the four should be written. For the

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upper-lines the 'pratinidhi' of 4th & 6th houses should not be used. For the even-numbered houses of the upper-lines, instead of the ultimate, the lower figure of the ultimate should be written. From the figures of the upper-lines, the number of varieties of the prastaras could be furnished. In the odd vertical lines, serially from bottom, varieties consisting of odd-numbers of Drutas, like one-Druta, along with Sarva-Drutanta (ADEPs) in the end, are written and in the even-lines, varieties consisting of zero-Drutas, and even-number of Drutas, like 2–Drutas, along with Sarva-Drutanta, in the end, are written. This is the method of Druta-meru. Also by totalling of all these figures of these vertical lines, the Sankhya could be obtained.

6. LAGHU-MERU

36 — 39 : Keep the lines of houses of Laghu - meru as in Druta-meru and write '1' in the first houses. Write the total of the ultimate, fourth and sixth houses in the remaining houses of the lowest line. Add the lower figure of the penultimate to the triplet of the remaining houses of the upper-lines. Here also the 'patinidhi' effects are as in Druta-meru. The figures of the vertical lines should be understood serially starting from the varieties of zero-Laghu, one–Laghu varieties in gradually increasing order of Laghus upto Sarva-Laghvantas (ALEPs). The total of all the figures form Sankhya.

7. GURU-MERU

40 — 43B : In Guru - meru write the second line with three houses lesser than the lowest-line and its upper-lines, four houses lesser than the precedent ones Write '1' in the first houses. Second house of the first line shoud consist of '2' and the remaining, the total of the ultimate, penultimate and sixth. From the second upper-line add the lower of the

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fourth to this total of the ultimate, penultimate and sixth. In place of Laghu keep Guru. The rest is as in Laghu-meru.

8. PLUTA-MERU

43C — 45 : In Pluta - meru write the second line with five houses lesser than the lowest line and its upper-lines six houses lesser than their previous ones. In the lowest line, in place of 6th take the 4th. The upper-lines include the lower of the sixth with the triplet. In place of Guru keep Pluta. The rest is as in Guru-meru.

9. SAMYOGA-MERU

46 — 65 ; In Samyoga-meru, the four vertical lines consist of houses upto the requirement of Drutas. Next two lines are of two houses lesser than their predecessors. Next two lines have one house lesser than the sixth. Next three lines have one lesser than the eighth. Next two lines have two houses less. Next two lines have one house lesser than their predecessors. Among them, the first four lines are of the varieties of Sarva-Drutantas (ADEPs), Sarva-Laghvantas (ALEPs), Sarva-Gurvantas (AGEPs) and Sarva-Plutantas (APEPs) respectively. First line has the number '1' in all houses, next line is of 'O' in odd-houses and '1' in even-houses. In Guru-line, three houses have 'O', 4th has '1' and in the same manner in each of four houses later. In Pluta-line five houses have 'O', 6th has '1' and in the same manner in the next six houses. The next six lines are of the duplets of DL, DG, DP, LG, LP and GP. This is the way of writing figures. Here figures are written starting from top to bottom. In respect of D, L, G and Ps ultimate, penultimate, 4th & 6th are taken respectively. The total of the figures of the respective combinations are to be written. The figures of the respective D, L, G & Ps of first four of the upper horizontal lines should be taken into account. In respect of ultimate,

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penultimate etc., of Druta etc., the above figures are in reverse order. Write 'O' if no figures are existing. The figures for the lines of triplets derived out of the quadruplets are also written in the same manner. For the three duplets, derived out of the triplets and which begin from the nearest figure, the above reverse order is followed. Only for the figure of the four triplets derived out of the quadruplets the above reverse order is to be followed. In the last five lines the four triplets and fifth quadruplet are DLG, DLP, DGP. LGP and DLGP. This is called Samyoga-meru and later the thing to be known is mentioned. By the figures of the horizontal lines pertaining to the vertical lines of Sarva-Drutantas (ADEPs), Sarva-Laghvantas (ALEPs) etc., the varieties should be known and their absence by 'O'. In this table the serial number of the horizontal line is the value of Druta of that Tala. Starting from the above the total of the numbers of all the lines is Sankhya.

10. KHANDA-PRASTARA

66 — 67B : Even for the varieties lacking Druta mentioned in Druta-meru etc., the prastara is same, but prastara should be made without violating the restrictions of Druta etc.

11. DRUTA-MERU-NASHTODDISHTA

67C — 73B : Lowest -line - even - number - nashta : The question number is subtracted from the Sankhya which is formed from particular meru figures. Then, from the remainder, the 3rd, 5th and the penultimate should be subtracted. If it is not sutractable, Laghu is obtained. If the next figure is not subtractable, or including it, if the next two figures are not subtracted, even without them, Laghu is obtained. If the next figure is subtracted, the un-deducted ultimate should be taken into account. Guru is obtained from the

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subtracted figure. Then, including the ultimate, the next four figures should be left-off. If the fifth is also subtracted the Guru becomes Pluta. This figure including the ultimate, should be omitted. If Angas like Laghu are obtained from the figures, the same method should be repeated in respect of the remaining figures. If Guru is obtained the un-deductible fifth becomes the remainder. In the absence of the figures Laghus should be written to fill-in the deficit of Tala.

73C — 75 : Lowest - line even-number - uddishta : In Uddishta, from Guru, the 3rd figure of the ultimate is obtained and four figures should be omitted as above. From Pluta, the 3rd and 5th figures are obtained and six figures should be omitted. Follow as above in respect of the remaining figures. From Laghu, no figure is obtained but two figures should be omitted. By subtracting the total of the obtained figures from the remainder, the Uddista should be answered.

76 : Lowest-line odd-number-nashta : For odd-houses the Nashta is as above. Druta is obtained from the ultimate figure as in Nashta of even-houses.

77 : Lowest-line odd-number-uddishta : For Uddishta, proceed as above. After obtaining the figure from Druta proceed as in Uddishta of even-houses.

78-81 : Upper-lines-nashta: For the even-houses of the upper-lines the lower of the 2nd should also be subtracted in addition. Druta is obtained from the undeducted figure and Laghu from the deducted. If figures are subtracted discontinuously the lower ones become higher ones. After obtaining Laghu etc., the figures of the same line should he omitted as above. The rest is as for the even-houses of the lowest-line. After leaving the figures the procedure should be started again as prescribed for the odd-houses or the even houses. For odd-houses of upper-lines follow as for the odd-houses of the lowest-line.

82-84B : Upper-lines-uddishta: Pluta etc., are obtained in Uddishta from the very same figures by

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subtracting which Pluta etc., are obtained in Nashta. Where there is Laghu in the vertical lines, in which zero-Drutas are in the first house, from that Laghu no figure could be obtained By subtracting the total of the obtained figures from the remainder, the Uddishta should be derived.

12. LAGHU - MERU

84C - 90 : For the lowest - line of Laghu - meru, Druta is obtained from the remainder as above from the deductible preceding figures, after deducting the question - number from the final figure. By subtraction of two previous figures and one upper figure, Guru is obtained. If the alternative figure of the figure giving out Guru, is also subtracted, the Guru becomes Pluta. In this manner the Nashta should be understood as told by Sarngadeva. For the Nashta of the upper - lines the 2nd, the lower of the 3rd and the 5th should be subtracted in reverse order. After the upper figures are disposed off, the previous method should be followed in respect of the remaining figures. Here, as in general - nashta, Drutas etc . , are obtained. But, while Laghu is obtained in respect of other Angas, it should be followed starting from the lower figure of the first. That lower figure should be followed as preferred for self-line. In the absence of the figure of the line, the Laghus, equal with the number of the lower-lines should be taken. This is for Nashta.

13. GURU-MERU-NASHTA

91 — 93 : The Nashta for the lowest-line of Guru-meru is as in general nashta. Pluta is obtained like Guru. The procedure in respect of the upper-lines will now be described. Here, in place of the lower of the 3rd, the 3rd should be subtracted, and in place of the 5th, the lower of the 5th should be subtracted. Like Laghu, if Guru is obtained, same procedure should be adopted as in the lowest-line. Guru is obtained like Laghu. In Nashta of upper-lines the rest is as in Laghu-meru.

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14. PLUTA-MERU-NASHTA

94 — 97B : Pluta-meru Nashta is as in general-nashta. For the 2nd and further upper-lines a difference should be noted. As it is done after obtaining Guru for Guru-meru, in this table, after obtaining Pluta, the same procedure should be followed as in the lowest-line. Either Druta, Laghu or Guru, obtainen from the last figure, becomes Pluta. The process should be repeated with the figures of the lowest-line after omitting six figures of the lowest-line of the ultimate figure. No ultimate figure of the lowest-Pluta-devoid-line becomes Pluta.

15. UDDISHTA OF OTHER MERUS

97C & D : The general-uddishta should be followed for the Uddishta of the three tables (merus) of Laghu etc.

6.2. SANSKRIT TEXT OF TALAPRASTARA OF NARTANANIRNAYA WRITTEN BY PUNDARIKA VITTHALA

(36 Slokas from 196th to 231st of Talaprakarana)

नर्तननिर्णय

अन्येन दर्शितास्ताला ग्रन्थविस्तरभीरुणा ।
तद्भेदज्ञापकोपायाश्चत्वारस्तान् ब्रुवेऽधुना ।1।

प्रस्तार संख्ये नष्टं चोद्दिष्टं चेत्यथ लक्षणम्।
न्यस्याल्पमाद्यान् महतोऽग्रस्तात् शेषं यथोपरि ।2।

प्रागूने वामसंस्थांस्तु सम्भवे महतो लिखेत् ।
अल्पानसम्भवे तालपूर्त्यै भूयोऽप्ययं विधिः । ।3।

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सर्वद्रुतावधिकार्यः प्रस्तारोऽयं लघौ गुरौ ।
प्लुतौ व्यस्ते समस्ते च न तु व्यस्ते द्रुते (ऽस्ति) च सः ।4।

ननु त्वया दलगर्पैः प्रस्तारोऽत्र दर्शितः ।
विरामादिस्वरूपस्य प्रस्तारः किन्नलक्षितः ।5।

ब्रूमो विश्रान्तिरूपस्य विरामस्य भवेद्यदि ।
प्रस्तारादिकमेतद्दलपान्तं तत्प्रसज्यते ।6।

तत्स्वाकारेत्वतिव्याप्ता शास्त्रं व्याकुलितं भवेत् ।
अतो विरामसहित प्रस्तारादिकथा वृथा ।7।

एकद्व्यङ्कौ क्रमान्न्यस्य युञ्जीतान्त्यं पुरातनैः ।
द्वितीयतुर्यषष्ठाङ्कैरभावे तुर्य षष्ठयोः ।8।

तृतीय पञ्चमाङ्काभ्यां क्रमात्तं योगमग्रतः ।
लिखेद्दक्षिणसंस्थैवमङ्कश्रेणी विधीयते ।9।

सा चाङ्कैरिष्टतालस्थ द्रुतसंख्यैः समाप्यते ।
द्रुतो लघुः सार्थमात्रो गुरुः सार्यद्विमात्रिकः ।10।

प्लुतः सार्थत्रिमात्रश्चेत्येकैक द्रुतवर्धितैः ।
तालभेदः क्रमादङ्कैः संख्यायन्ते स्थितैरिह ।11।

यदङ्कयोगादन्त्योऽङ्कोलब्धस्थैरन्ततः क्रमात् ।
भेदा द्रुतन्ता लघ्वन्ता गुर्वन्ताश्च प्लुतान्तकाः ।12।

संख्यायन्त इति प्रोक्ता संख्या निश्शङ्कसूरिणा ।
अत्रैत्रावधितो भेदः किं रूप इति पृच्छति ।13।

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यत्र तन्नष्टमाख्यातं तस्योत्तरमिहोच्यते ।
भेदानां यावतां मध्ये नष्टप्रश्नः कृतो भवेत् ।14।

तावत्संख्याङ्कपर्यन्तां लिखेत् संख्याङ्कसन्ततिम् ।
अन्त्याङ्के तत्र नष्टाङ्कं पातयेदथ शेषतः ।15।

पातयेत्पूर्वपूर्वाङ्कं तत्रत्वपतिताद्धृतः ।
पूर्वश्चेत्पतितो न स्याल्लघुस्तु पतिताद्भवेत् ।16।

उत्तरेणाकृतार्थेन सहितात्तदसम्भवे ।
अकृतार्थेन पूर्वेण सान्तरे पतिते पृथक् ।17।

लघुर्निरन्तरेत्वस्मिन् लघुरेव गुरुर्भवेत् ।
गुरुहेतोस्तृतीये तु पतितेगः प्लुती भवेत् ।18।

अङ्काऽभावे द्रुताग्राह्यास्तालपूरणहेतवः ।
इति नष्टस्य विज्ञेयमुत्तरं रूपनिर्णयात् ।19।

ईदृगूपोऽत्र कथितो भेदे यत्र इतीरितः ।
उद्दिष्टं तत्र सख्याङ्कसन्ततिं नष्टवल्लिखेत् ।20।

यैरङ्कैः पतितैर्नष्टे लभ्यन्ते ये प्लुतादयः ।
तानेवाङ्कान् समादाय त्वन्त्याङ्के पातयेत्ततः ।21।

अङ्काःस्युरवशिष्टा येतेभ्य उद्दिष्टसाधनम् ।
तालव्यत्यय प्रस्तारेऽथोऽथो दलगपान् क्रमात् ।22।

न्यसेद् वामेतदूर्ध्वस्थान् दक्षिणो द्रुतपूरणम् ।
किन्तु सव्यत एकैकं त्यक्त्वा प्रस्तारयेत् क्रमात् ।23।

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नष्टोद्दिष्टं कथं ज्ञेयं प्रस्तारेऽत्र विपर्यये ।
प्रश्नाङ्कैरेव कार्येहि नष्टे चैकं परित्यजेत् ।24।

उद्दिष्टेचैकमादाय शेषकार्यंतु पूर्ववत् ।
द्रुतादिकान्तप्रस्तारं हारखण्डचतुष्टये ।25।

तत्तत्प्रधानकं रूपं कृत्वा तु प्राक् निरर्थवत् ।
तत्तत्संख्यान्ततः प्रश्नान्नष्टोद्दिष्टेतु पूर्ववत् ।26।

नष्टोद्दिष्टं कथं चात्र मध्यरूपोपरिस्थिते ।
निश्चित्य मध्यरूपाङ्कं तत्रैकाङ्कं परित्यजेत् ।27।

शेषप्रश्नाङ्कमादायोपरिनिष्ठन्तु पूर्ववत् ।
उद्दिष्टे लब्धकाङ्केषु मध्याङ्कं तत्र पातयेत् ।28।

शेषमेकं समादाय शेषकार्यंतु पूर्ववत् ।
नष्टोद्दिष्टप्रकारं हि मध्यरूपादधः कथम् ।29।

लुप्तमध्याङ्कके चैकं युक्तान्यत् पूर्ववत्स्मृतम् ।
उद्दिष्टे मध्यमाङ्केषु लब्धाङ्कान् सुपरित्यजेत् ।30।

शिष्टमध्याङ्कतश्चैकमादायोद्दिष्टमीरितम् ।
संख्याङ्कसन्ततेश्चाथ आदावेकाङ्कक न्यसेत् ।31।

अन्त्योपरिस्थ संख्याङ्कानन्त्यादींश्चतुरस्तथा ।
अन्त्योपान्त्य तुर्य षष्ठमन्त्यादूर्ध्वस्थितं तथा ।32।

पञ्चाङ्कयोगादन्त्याङ्को भवेत् पाताल संज्ञकः ।
स्वपङ्क्तिस्थां लिखेदग्रे संयोज्येष्टद्रुतं क्रमात् ।33।

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ज्ञायन्ते सर्वभेदस्थाः पाताल. सोऽभिधीयते ।
संख्योपान्त्यं पातयित्वा पातालान्त्याङ्कतः क्रमात् ।34।

तत् शिष्टाङ्कश्च पातालोपान्त्याधः क्रमशो लिखेत् ।
तदङ्कात् सर्वपातालमादिशेद्विठलोदितम् ।35।

द्रुतलघुगुरुत्रिमात्रा मेरुसंयोग मेरवो व्यर्थाः ।
इति मत्वाऽत्र न लिखिताः पर्वतखननाच्च मूषकप्राप्तिः ।36।

6.2.1. FREE ENGLISH TRANSLATION

1 – 2B : These are the four Upayas to know precisely the varieties of Deshya Talas : Prastara, Sankhya, Nashta and Uddishta.

1. PRASTARA

2C-7 : Write desired Tala to be permuted in its original form and (among its Angas) under the first Mahat (higher Anga) Alpa (lower Anga) is established, writing the remaining as in the above line. If there is a lesser Anga behind this, then the one on the left should be regarded as Mahat and should be written (again) for completingthe Tala. If it is not available Alpa itself should be written. This procedure should be incessantly continued till only Drutas remain. In Laghu, in Guru and in Pluta, permutation should be carried out individually and in combination. But there is no permutation in a single individual Druta. 'You have described permutation only in DLGP but not for Virama etc., why?' (if so objected) I shall explain. If prastara etc., of Viama, which is of the nature of pause are executed, then it contradicts the prastara of DL. Also it creates a logical fallacy of over-extension (Ativ-

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yapati) leading to confusion id the Shastra. Therefore the description of prastara of Virama of LGP is futile.

2. SANKHYA

8 – 13B : Write figures '1 & 2', then combine the ultimate with the precedent second (penultimate), 4th and 6th figures. If the 4th and 6th are absent, it (i.e., the last figure) should be added instead to the 3rd and 5th respectively. Thus, a series of figures should be written to the right further and further. It (i.e., the series of figures) should be ended with the number of Drutas equal to the size of the permuted Tala. Druta, Laghu, 1½ Matra, Guru, 2½ Matras, Pluta, 3½ Matras - in this way the number of Tala varieties having Drutas, regularly increased by one, can be known from the figures written here. By adding what- ever figures the final figure is obtained, from these figures, the number of Tala varieties ending in Druta, ending in Laghu, ending in Guru and ending in Pluta can be obtained as stated by Sarngadeva.

3. NASHTA

13C – 19 : Wherein it is asked here (i.e., in the Sankhya series) 'what is the form of such and such numbered Tala variety?' it is named Nashta. Its answer is now given. Whatever the varieties among which the Nashta question is raised, the Sankhya series should be written till that figure. Then from the remainder the further precedent figures should be subtracted. While doing so that which cannot be subtracted indicates Druta. If its previous figure remains un-subtracted, the subtracted figure adds to the next of the 'Akritartha', and if that is not available it adds to the figure previous to the 'Akritartha'. If there are figures which can be subtracted discontinuously (i.e., at intervals), the Laghu is to be reckoned as seperate. But if they can be subtracted consecutively or successively such a Laghu becomes Guru. If the third figure from that figure

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which yeilds Guru, can be subtracted, the Guru becomes the Pluta. If there are no figures left for subtraction, Drutas should be added till the Tala is completed. The answer to determine the form of the desired Tala variety should be thus known from Nashta.

4. UDDISHTA

20 – 22B : Wherein it is asked 'how manieth is the Tala variety as derived here in Nashta ?' it is Uddishta. Herein the Sankhya series of figures should be written as in Nashta. Whatever the figures, which on subtraction, give whatever Pluta etc., in Nashta, the same figures should be added and subtracted from the final figure (indicating Nashta). Uddishta results from the same figures which are the remainders.

5. VIPARITA - PRASTARA

22C - 23 : In the reversed Tala - prastara, DLGP should be written in reverse order respectively, one below the other. The Anga higher to it should be written to the left. Drutas should be added to the right till the Tala is completed. But, prastara should be executed by dropping respectively the one's line to the left.

6. VIPARITA - NASHTODDISHTA

24 - 25B : 'How to understand Nashtoddishta in this Viparita - prastara ?' (both) should be done from the question numbers themselves. But, in Nashta '1' should be subtracted, in Uddishta '1' should be added. The remaining procedures are as before.

7. DRUTAHARA - NASHTODDISHTA

25C - 26 : In the prastara of four garland segments ending in Druta etc., the respective (form) should be made predominant and the precedent is to be ignored. The respective question number should then be subtracted from Sankhya. Nashtoddishta are as before.

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8. MADHYARUPA - UPARISTHITA - NASHTODDISHTA

27 - 29B : Here, how are Nashtoddishta executed? Determine the figure of the medial form (Madhyarupa). Subtract '1' from it. Add to the remainder the question number which is above. In Uddishta subtract the figure of the medial from from the 'Labdha' figure. Add '1' to the remainder. The remaining procedure is as above.

9. MADHYARUPA - ATHASTHITA - NASHTODDISHTA

29C - 31B : 'How are Nashta and Uddishta to be executed below medial form?' Add '1' to the subtracted figure of the medial form. The rest is as before. In Uddishta the 'Labdha' figure is subtracted from the medial number. By adding '1' to the remaining figure of the medial form, Uddishta is described.

10. PATALA

31C - 34B : The digit '1' should be written at the bottom (i. e., at the extreme left) of the Sankhya series. The Sankhya number above the last (number in the Patala row) as well as the four numbers beginning with the last (viz., last, second, fourth and sixth) in its own row, should be written. When added together, regularly, they enumerate exactly all the Drutas in all the permutations of a prastara. This is called Patala. The final number obtained by adding together these five numbers viz., the ultimate, penultimate, fourth and sixth as well as the number (of Sankhya) lying above the ultimate is called Patala.

11. MAHAPATALA

34C - 35 : By subtracting the penultimate (Upantya) Sankhya figure from the ultimate (Antya) Patala figure, further and further, the remaining figure should be written below the penultimate of the Patala regularly. By such figure Sarvapatala (Mahaptala) is taught as described by Vitthala.

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12. MERUS OF ANGAS

36 : Thinking that the Merus of Druta, Laghu, Guru and Pluta and the Samyoga - merus are useless, they are not written here, because it would be like getting a mouse by digging a mountain.

6.3. MAJOR REFORMS MADE BY THE AUTHOR IN THE OLD TEXTS

Though the Tala chapter of Indian music was mentioned in many of our ancient and recent books, the intricacies of this element, Prastara have been dealt with only in the following books :

1. Sangeetasamayasara (Sanskrit) - Parshvadeva of 12—13th century.
2. Sangeeta Ratnakara (Sanskrit)-Sharngadeva of 13th century.
3. Sangeetopanishatsaroddhara (Sanskrit) - Sudhakalasha of 14th century.
4. Talakalabhi (Sanskrit) - Achyutaraya of 16th century.
5. Sangeetasuryodaya (Sanskrit) - Lakshminarayana of 16th century.
6. Nartananirnaya (Sanskrit) - Pundarika Vitthala of 16th century.
7. Sangeeta Darpana (Sanskrit) - Chatura Damodara of 16-17th century.
8. Ragatalachintamani
9. Taladashapranapradeepika

   (Telugu - Poluri Govindakavi of 17th century.)
10. Talasamudram (Tamil) - Vanapadachudamani of 17th century.
11. Vaishnava Sangeetashastra (Sanskrit) - Narahari Chakravarthy of 18th century.

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12. Gayakalochanam (Telugu) - Tacchoor Singaracharya Bros., of 1902.

13. Mathematical basis of the Tala system (English) - - K. Ramachandran of 1962.

Among the above Sangeeta Ratnakara, along with two commentaries had furnished more detailed information with tables of figures and definitions about this element than any other book. The Taladhyaya of this, in total, consists of 408 Slokas, in which the five Marga Talas have been elaborated in the first 235 Slokas, the 120 Desi Talas have been listed out in the next 76 Slokas and the element, Prastara itself has been elaborated in the remaining 97 Slokas. The greater importance of this element has very well been noticed, even in those olden days by Sharngadeva who had obviously devoted nearly one-fourth of his Tala-chapter for its elaboration only. But, unfortunately, not only in the commentaries of Kallinatha and Simha-bhoopala but also even in the text some confusive versions have been furnished. Later, some interesting new methods of this element have been prescribed by Sudhakalasha, Achyutaraya and Pundarika Vitthala in their works.

In addition to the Chaturanga-prastara (Chaturashra-jati), which has been elaborated with the help of tables of figures and definitions in Sangeeta Ratnakara & Sangeeta Darpana, Virama-prastara has also been defined briefly in Sangeeta Darpana. While both Panchanga-prastara (Chaturashra-jati) and Virama-prastara have been elaborated in Sangeetasuryodaya with the help of tables of figures and definitions, both Chaturanga (Chaturashra-jati)and Panchanga (Trisra, Khanda, Mishra & Sankeerna-jatis) - prastaras have been elaborated in Ragatalachintamani and Taladashapranapradepika with the help of only poems but without any tables of figures. And in Gayakalochanam a number of tables of figures pertaining to both Chaturanga (Chaturashra-jati)and Panchanga (Trisra, Khanda, Mishra&Sankeerna-

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jatis) - prastaras have been furnished but without any definitions.

So, to bring out all the latent secrets of this element within the easy reach of the aspirant these following modifications have been made by the author to help clear understanding of the various techniques and also to remove the textual inconsistencies in the different early texts dealing in these matters.

6.3.1. MODES OF PERMUTATION

In the ancient days only Chaturanga-prastara, in which the four Angas, Druta, Laghu, Guru and pluta were used in the process of permutation of the Angas pertaing to Chaturashra-jati only, was used. In those days, while Virama was prohibited to be used only in the process of permutation (but not from usage) having a fluctuative value of half-duration of another Anga to which it was appended, Kakapada was prohibited not only in the process of permutation but also even from using it in any Tala, which is not justifiable as it was prescribed in many Talas like Simhanandana.

Later, along with this Chaturanga-prastara, the Panchanga-prastara in which the five Angas, Anudruta, Druta, Laghu, Guru and Pluta were used in the process of permutation of Angas pertaining to all Jatis other than Chaturashra-Jati, was also used. Around this time, Virama-prastara, which was even basically incorrect wherein the process of permutation had been concluded with either Druta or Druta-virama or both, violating the general norm of concluding with either Virama or Druta, was also prescribed in some books.

Some time later, another Shodashanga-prastara, in which all the six Angas, Anudruta (Anudruta was called as Virama having a fixed duration of one-unit at this time), Druta, Laghu, Guru, Pluta and Kakapada, along with interlaced combinations of these above Angas, were used in the process of permutation of

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Angas pertaining to Chaturashra-jati only, in which Sharabhanandana was one of these varieties, was also used.

Now, in this book (a) Panchanga-prastara, where in the five Angas, Druta, Laghu, Guru, Pluta and Kakapada are used in the process of permutation of Angas pertaining to only Chaturashra-jati, (b) Shadanga-prastara, wherein all the six Angas, Anudruta, Druta, Laghu, Gurn, Pluta and Kakapada are used in the process of permutation of Angas of all Jatis and (c) Samyuktanga-prastara (correct name of Shodashanga-prastra), wherein all the six Angas, Anudruta (called as Virama having a fixed duration of one-unit), Druta, Laghu, Guru, Pluta and Kakapada, along with other interlaced combinations of all these above Angas, are used in the process of permutation of Angas pertaining to all Jatis (prescribed in figures but could be transliterated into Angas) are prescribed with tables of figures, definitions and suitable rules framed by the author.

6.3.2. ALLOCATION OF DIVISIONS OF PRASTARA

In his Sangeeta Ratnakara Sharngadeva had prescribed 19 easy methods to know the details of the rhythmical forms and they are : 1. Prastara 2. Sankhya 3. Nashta 4. Uddishta 5. Patala 6. Druta - meru 7. Druta-meru-nashta 8. Druta-meru-uddishta 9. Laghu-meru 10. Laghu-meru-nashta 11. Laghu-meru-uddishta 12. Guru-meru 13. Guru-meru-nashta 14. Guru-meru-uddishta 15. Pluta-meru 16. Pluta-meru-nashta 17. Pluta-meru-uddishta 18. Samyoga-meru 19. Khanda-Prastara. As all these are only easy methods and also as this total number varies with the other modes of permutation like Panchanga-prastara and Shadanga-prastara which are named basing upon the number of Angas used in the process of permutation, they cannot be treated as divisions. So, in the Telugu version, Tala-prastarasagara, of this book, two main divisions, (a)

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Nija-prastara with five sub-divisions. 1. Sankhya 2. Mahapatala 3. Nashta 4. Uddishta and 5. Nashtanga and (b) Khanda-prastara with two sub-divisions, 1. Heena-prastara and 2. Yukta-prastara have been prescribed. But, later, having found this kind of division also to be incorrect as Nashta, Uddishta and Nashtanga, which are only different methods like subtraction, multiplication etc., to answer relevant mathematical questions, should not be treated as divisions and also as they are applicable to both Nija-prastara and Khanda-prastara alike, another kind of division, with suitably altered names, is here by prescribed. Thus, Nija-prastara has been re-named as Akhanda-prastara to make its name identical with Khanda-prastara and these two have been made the main divisions. As all the different tables of Angas have, in fact, been originated only by the means of Heena-prastara and Yukta-prastara, which have not been included in the above list of Sangeeta Ratnakara, these two have been made the sub-divisions of Khanda-prastara. Another kind of permutation of reverse order, Viparita-prastara, prescribed by Pundarika Vitthala in his Nartananirnaya has been re-named as 'Viloma-prastara' to be identical with the name 'Anuloma-prastara', the general obverse process of permutation (these two names have been coined by the author). These two have been made divisions of all the above main and sub-divisions of prastara and each one of them consists of two key-figures, 1. Sankhya, the total number of prastaras and 2. Mahapatala, the total number of all the Angas used in the process of permutation.

A method to obtain the details of all the different Angas or figures used in the process of permutation upto the required prastara in question which has been discovered and named as 'Nashtanga' by the author, has been prescribed in the Telugu version. But, a similar method, which has long ago been named as 'Kalita' by Sudhakalasha in his Sangeetopanishatsaroddhra

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has later been found and so, now, the 'Nashtanga, has been re-named as 'Kalita' and prescribed in this book with examples along with Nashta and Uddishta.

In his Nartananirnaya Pundarika Vitthala had also prescribed Viparita-nashtoddishta, Drutahara-nashtoddishta, Madhyarupa-uparishtita- nashtoddishta and Madhyarupa-athasthita-nashtoddishta. Among them the Drutahara-nashtoddishta is nothing other than a duplication of general Nashta and Uddishta and so this has been dropped. Among the remaining, Viparita (reverse)-nashtoddishta has been re-named as 'Vilomanashtoddishta' to be identical with the name 'Anulomanashtoddishta' which is the general-obverse-nashtoddishta and along with Madhyarupa-uparisthita-nashtoddishta and Madhyarupa-athasthita-nashtoddishta, all these have been made divisions of Nashta and Uddishta.

This kind of division, which is applicable to all Jatis of all modes of permutation, is prescribed in the early chapters of this book.

6.3.3. RULES FOR THE PROCESS PRASTARA

The mode of permutation, either of obverse order or reverse order, was not defined clearly in any book, as such, suitable rules of different kinds of permutation have been formulated and prescribed in the II chapter of this book with examples.

6.3.4. THE PROCESS OF ARRIVING AT THE FIGURES OF TABLES

In respect of writing the figures of the different tables Sharngadeva contradictively prescribed to write figures both '1 & 2' for Sankhya of Akhanda-prastara and '1' or both 1 & 2' for different lines of different tables in different ways. But, he did not give any explanation for this disparity. He also prescribed to take the 3rd and 5th figures, which were called 'Pratinidhis'

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(proxies) by him, into account in the absence of the 4th and 6th figures respectively but its application differs with each table and its lower and upper horizontal lines. Moreover, in support of the application of these 'Pratinidhis' to all the other tables he had gone to the extent of even deliberately altering the correct version of Druta-meru. In his Nartananirnaya Pundarika Vitthala also followed Sharngadeva in writing the figures of Sankhya but, surprisingly, at some other place he, correctly, prescribed to write figure '1' even before the very first house of Sankhya by which the 'Pratinidhi' system could be avoided. In Gayakalochanam, correctly, the figure '1' is written, even before the very first house of Sankhya and the lowest lines of all tables.

So, figure '1' is hereby prescribed to be written in the left extreme, even before the very first house, of all Sankhya lines and all the lowest-lines of all the tables of all the Angas (except for Samyoga-meru) pertaining to all modes of permutation as prescribed in Gayakalochanam. Thus, the cumbersome 'Pratinidhi' has entirely been eliminated, but, the word 'proxy' has been prescribed in this book to be used in a different way representing the numbers of the preceding houses, which are basically most important of this element, along with the relevant rules to arrive at the figures of all the tables.

6.3.5. PATALA AND MAHAPATALA

The 'Patala' furnished by Sharngadeva, in his Sangeeta Ratnakara denotes the total number of the inferior Angas used in the process of Akhanda-prastara and its figures could be obtained by writing the total of the figures of the upper-Sankhya-house of the preceding 1st and preceding 1st, 2nd, 4th and 6th houses of the same Patala-line.

Along with the above Patala, another 'Mahapatala' which denotes the total number of all the different

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Angas used in the process of permutation, has also been furnished by Pundarika Vitthala in his Nartananirnaya but he prescribed to obtain it by subtractig the penultimate (Upantya) Sankhya from the ultimate (Antya) Patala figure and write the remainder below the penultimate of Patala. This rules does not facilitate to write the Mahapatala figures from the very first house. But, as per the version prescribed in Taladashaprana pradeepika they could be obtained by writing the total of the preceding 1st, 2nd,4th and 6th figures of Patala treating the respective upper-Patala-figure as the prceding 1st. While the Sankhya, Patala and Maha Patala pertaining to Chaturanga-prastara are furnished in Nartananirnaya, they have all been extended to both Chaturanga and Panchanga-prasta as in Gayakalochanam.

In fact, the Patala figures are also included in Mahapatala and Mahapatala is far more useful than Patala facilitating very easy application of 'Kalita' which furnishes the full details of all the Angas until the required prastara in question. Keeping the omnipotency of Mahapatala in view, the Patala has entirely been eliminated in this book and Mahapatala, with a direct link with Sankhya, which has been discovered by the author of this book, has been furnished and the same could be obtained by arriving at the total of all respective preceding proxies of both Sankhya and Mahapatala. Moreever, unlike in any other book this Mahapatala has also been extended to almost all the tables of Khanda-prastara and furnished with tables of figures and suitable key-rules in the II chapter of this book.

6.3.6. NASHTA AND UDDISHTA

Nashta and Uddishta, which could be answered with the help of Sankhya are the most important and vital aspects of this element and they have been elaborated from the Slokas 13th to 23rd of Sangeeta

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Different versions of the table of

CHATURANGA (AKHANDA)– PRASTARA :

(a) version furnished in Sangeeta Ratnakara,

(b) version furnished in Gayakalochanam,

(c) modified version deleting 'Patala' and linking-up 'Mahapatala' with 'Sankhya'.

(a)

O	I	OI	S	OS	$	O$	I$	OI$
1	2	3	6	10	19	33	60	106
1	2	5	10	22	44	91	180	358

(b)

	O	I	OI	S	OS	$	O$	I$	OI$
1	1	2	3	6	10	19	33	60	106
	1	2	5	10	22	44	91	180	358
	1	3	7	16	34	72	147	298	592

(c)

	1	2	3	4	5	6	7	8	9
1	1	2	3	6	10	19	33	60	106
	1	3	7	16	34	72	147	298	592

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Shyama Shastri's version of the table of Akhanda-prastara pertaining to Trisra-Jati-Panchanga said to have been written in his own hand-writing

(* correct figures)

Unit-Value of Talanga-		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sankhya -	*1	1	2	4	7	13	25	46	86	162	306 *302	561 *565	1066 *1058	1114 *1978	3728 *3700	6175 *6923	13041 *12949	24407 *24223	45651 *45315
Patala -		1	2	5	12	26	56	120	250	517	1012 *1062	2163 *2159	4372 *4364	8715 *8775	17600 *17552	35068 *34964	61620 *69396	137750 *137270	271734 *270734
Mahapatala -		1	3	8	11 *19	43	95	204	431	100 *900	1857	3803 *3799	7721 *7717	15606 *15574	31340 *31264	62645 *62473	124701 *124321	247327 *246511	488161 *487237

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Ratnakara. This is the only book in the annals of music literature in which Nashta and Uddishta have been furnished with definitions and examples by the commentators than any other book. But, unfortunately, the modus operandi of Nashta and Uddishta furnished in it is not at all clear to follow and it looks either the author himself or even the commentators have furnished their respective versions keeping the answers only first in view. Moreover, the so called 'un-deducted right or left figure' (akritarthena-uttarena or akritarthena-purvena) presribed in this respect by all of them has become more ambiguous than any other aspect of this element. And also in Kallinatha's commentary, at one place, a contradictory observation has been furnished that, though, Druta can be obtained if the first figure is not deducted, in the very same manner, Druta cannot be obtained wherever there is an undeducted figure after a deducted figure or even before a deducted figure ..... and so on. He also mentioned at another place that two, four and six houses should be left-off after obtaining Laghu, Guru and Pluta respectively against which, as per the correct version, one, two and four houses only should be left-off.

In his Nartananirnaya, along with the general-nashtoddishta, Pundarika Vitthala prescribed entirely different varieties of Nashtoddishta also and they are : 1. Viparita-nashtoddishta 2. Drutahara-nashtoddishta 3. Madhyarupa-uparisthita-nashtoddishta and 4. Madhyarupa-athasthita - nashtoddishta. Among them Viparita (reverse)-Nashtoddishta has been re-named as 'Viloma-nashtoddishta' to be identical with the name of 'Anuloma-nashtoddishta' which is the general-obverse-nashtoddishta and tney both have been included in the divisions of Nashta and Uddishta. The prastaras, basing upon the Anges occur in the right extreme, are called as Drutantya-prestaras, Laghvanta-prastaras, Guryanta-prastaras etc. But, Pundarika Vitthala named them as Drutahara-prastaras etc., trea-

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ting the Drutas etc.. which occur in the right extreme as pendants and accordingly he had also prescribed Drutahara-nashtoddishta with a brief definition following the general-nashta. As the application of the process of this Drutahara-nashtoddishta is one and same as in general-nashtoddishta this has been dropped.

Pundarika Vitthala had also briefly prescribed Madhyarupa-uparisthita - nashtoddishta and Madhyarupa-athasthita-nashtoddishta which facilitate to obtain the Nashtoddishta for the upper and lower prastaras of a midmost-prastara. For Uparisthita-nashta he prescribed to subtract figure '1' from the midmost-number of prastara, to add the question number to it and later to follow as in general-nashta. For Uparisthita-uddishta he prescribed to subtract the midmost-number of prastara from the figure of superior Angas of the questlon-prastara and to add figure '1' to it by which the answer could be obtained. For Madhyarupa-athasthita-nashta he prescribed to add figure '1' to the subtracted figure of the midmost-number and later to follow as in general-nashta. For Athasthita-uddishta he prescribed to subtract the figure of the superior Angas from the midmost-number and to add figure '1' to the remainder by which the answer could be obtained. As the rules for the mode of application for Sankhya of odd and even numbers have not at all been prescribed, relevant rules have been framed by the author and prescribed in this book. Though the rules prescribed by him for Uparisthita-nashtoddishta are correct, another set of rules have been framed by the author and prescribed in this book bringing out the very important link between the Viloma-Saakhya and the respective prastara discovered by the Great Pundarika Vitthala. Also as rhe rules prescribed for Athasthita-nashtoddishta are neither clear nor adequate a fresh set of rules have been framed by the author and prescribed in this book.

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All these rules, including the modified rules of Sangeeta Ratnakara, have been furnished in the III chapter of this book with a number of examples.

6 3.7. KALITA

While finding a new method for writing the figures of Mahapatala linking them with Sankhya directly and entirely eliminating the less important Patala, a very interesting link between these two lines of Sankhya and Mahapatala has, accidentally, been discovered by the author which facilitates to know the full details of all the Angas or figures upto a required permutation in question and this has been named by the author as 'Nashtanga' and prescribed with examples in the Telugu version, Talaprastarasagara, along with relevant key-rules. But, a similar method which has long ago been named as 'Kalita' by Sudhakalasha has later been found in his Sangeetopanishatsaroddhara. So, the 'Nashtanga' has been re-named as 'Kalita' and mentioned in the III chapter of this book but linking it with Sankhya and extending it to Akhanda and Khanda-prastaras alike.

6.3.8 TABLE OF DRUTA (Druta-meru)

The Druta-meru furnished by Sharngadeva in his Sangeeta Ratnakara is not in accordance with other tables given by himself. In Gayakalochanam at the top of each vertical line of Druta-meru while furnishing the value of prastara the Angas of the first-prastara have been furnished. As, writing thus the Angas of the first-prastara at the top sometimes becomes contrary in respect of Devoid-permutation or Consistent-permutation of a specific nature, the value of the prastara has been furnished in figures at the top in this book. The Druta-meru has correctly been modified and prescribed with relevant key-rules in the II chapter of this book.

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Incorrect version of the table of Druta pertaining to Chaturanga-prastara furnished in

(a) Sangeeta Ratnakara,
(b) Gayakalochanam and
(c) the corresponding correct version.

1 1
1 1 7 8
1 1 5 6 20 27 (a)
1 1 3 4 9 14 25 44
1 1 2 2 5 4 12 7 26
1 2 3 4 5 6 7 8 9

0 1 Ś
1 Ś 1 9D
0 Ś 1 0 8D
Ś 1 0 8 7D
0 S 1 0 7 0 6D
S 1 0 6 0 27 5D (b)
0 1 1 0 5 0 20 0 4D
1 1 0 4 0 14 0 44 3D
0 1 0 3 0 9 0 25 0 2D
1 0 2 0 5 0 12 0 26 1D
1 0 1 0 2 0 4 0 7 0 0D

1 2 3 4.5 6 7 8 9
1 9
1 0 8
1 0 8 7
1 0 7 0 6
1 0 6 0 27 5 (c)
1 0 5 0 20 0 4
1 0 4 0 14 0 44 3
1 0 3 0 9 0 25 0 2
1 0 2 0 5 0 12 0 26 1
1 0 1 0 2 0 4 0 7 0 0

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6.3.9 TABLE OF COMBINATIVE ANGAS (Samyoga-meru)

As in the case of Druta-meru Sharngadeva had also furnished an altered version of Samyoga-meru in his Sangeeta Ratnakara. In it, in total, while there are 13 horizontal lines basing upon the unit-value of permutations in increasing order i. e , 1–Druta, 2–Drutas, 3–Drutas and so on upto 13–Drutas there are 15 vertical lines pertaining to IAEPs (Identical-anga-ending-permutations) of 1. Druta 2. Laghu 3. Guru 4. Pluta, duplets of 5. DL 6. DG 7. DP 8. LG 9. LP 10. GP, triplets of 11. DLG 12. DLP 13. DGP 14. LGP and a quadruplet 15. DLGP. Unfortunately, he had so altered the order of these vertical lines that he had to add 1, 3, 5, 1, 1 & 3 numbers of zeros extra in the beginning of each of the vertical lines of L, G, P, DP, LP and GP respectively. Had he made the correct division basing upon their unit-value in serial order i.e., 2, 4, 6, 8, 10, 12, 12, 14, 14, 16, 18, 20, 22, 24 & 26 units of D, L, DL, G, DG, LG, P, DLG, DP, LP, DLP, GP, DGP, LGP and DLGP respectively, it would have been more aesthetic and also helpful fo the reader by avoiding the extra zeros. Moreover, as only Chaturanga-prastara was dealt with in Sangeeta Ratnakara, its author must not have come across any problem to write the figures of vertical lines of duplets while taking the figures of IAEPs of upper-horizontal-lines into account. But, as this method prescribed in Sangeeta Ratnakara went wrong while writing such figures pertaining to other Jatis of other modes of permutation, another specific method which could be applicable to Samyoga-merus of all the Jatis of all modes of permutation has been discovered by the author and furnished with suitable key-rules in the II chapter of this book.

In the end of his commentary of 369th (58th) Sloka, Kallinatha had incorrectly prescribed to write figure '4' instead of figure '3' in the 8th house of GP-line.

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Samudayanga-meru furnished in Gayakalochanam

0-1		
D	0	1
0	0	1
1	1	0

1-2		
D	L	
0	1	1
1	0	1
2	1	0

01-3		
D	L	
0	1	1
2	2	2
0	0	3
3	1	0

S - 6			
D	L	G	
0	2	2	5
1	0	3	1
2	3	1	0
3	0	0	0
4	1	0	0

05-10			
D	L	G	
0	0	3	8
1	5	4	2
2	0	3	0
3	4	0	0
4	0	0	0
5	1	0	0

S - 17				
D	L	G	P	
0	4	5	14	18
1	0	7	5	1
2	9	6	0	0
3	0	1	0	0
4	5	0	0	0
5	0	0	0	0
6	1	0	0	0

05-33				
D	L	G	P	
0	0	7	23	31
1	12	12	10	2
2	0	10	0	0
3	14	4	0	0
4	0	0	0	0
5	6	0	0	0
6	0	0	0	0
7	1	0	0	0

15-40				
D	L	G	P	
0	7	10	39	55
1	0	21	20	5
2	25	18	1	0
3	0	10	0	0
4	20	1	0	0
5	0	0	0	0
6	7	0	0	0
7	0	0	0	0
8	1	0	0	0

015-106				
D	L	G	P	
0	14	65	9	
1	26	34	38	10
2	0	33	3	0
3	44	20	0	0
4	0	5	0	0
5	27	0	0	0
6	0	0	0	0
7	8	0	0	0
8	0	0	0	0
9	1	0	0	0

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(a) In-correct version of the table of combinative angas of Chaturanga-prastara furnished in Sangeeta Ratnakara and (b) the corresponding correct version.

0 I S $\frac{1}{S}$
1 0 0 0
1 1 0 0 01
1 0 0 0 2
1 1 1 0 3 0S
(a) 1 0 0 0 7 2 0$\frac{1}{S}$ 1S
1 1 0 1 11 3 0 2 1$\frac{1}{S}$ S$\frac{1}{S}$ 01S
1 0 0 0 20 4 2 0 0 0 6
1 1 1 0 32 5 3 3 2 0 12 01$\frac{1}{S}$
1 0 0 0 54 9 4 0 0 0 32 6
1 1 0 0 87 13 5 7 3 2 60 12 0S$\frac{1}{S}$
1 0 0 0 143 18 6 0 0 0 134 32 6 1S$\frac{1}{S}$
1 1 1 1 231 24 7 11 4 0 251 60 12 6 01S$\frac{1}{S}$
1 0 0 0 376 35 11 0 0 0 500 122 20 0 24

0
1 1
1 1 01
1 0 2 S
1 1 3 1 0S
1 0 7 0 2 1S $\frac{1}{S}$
1 1 11 0 3 2 1 01S 0$\frac{1}{S}$
(b) 1 0 20 0 4 0 0 6 2 1$\frac{1}{S}$
1 1 32 1 5 3 0 12 3 2 01$\frac{1}{S}$
1 0 54 0 9 0 0 32 4 0 6 S$\frac{1}{S}$
1 1 87 0 13 7 0 60 5 3 12 2 0S$\frac{1}{S}$
1 0 143 0 18 0 0 134 6 0 32 0 6 1S$\frac{1}{S}$
1 1 231 1 24 11 1 251 7 4 60 0 12 6 01S$\frac{1}{S}$
1 0 376 0 35 0 0 500 11 0 122 0 20 0 24

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In Gayakalochanam, probably being unware of the correct version of Samyoga-meru, an entirely different version with different name 'Samudayanga-meru', which is of a mere duplication of figures of all the tables of Angas together, has been furnished by the authors.

So, keeping all the above in view, the modified version of Samyoga-meru, including Mahapatala also in it, which is applicable to all the Jatis and modes of permutation, has been furnished with suitable key-rules in the II chapter of this book.

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Chapter-7

Old Lists Of Talas Furnished Along With Serial Numbers

In the annals of the music literature there are only two books on music in which the serial numbers have been furnished for the Talas prescribed in them and they are : 1. Sangitasamayasara (Sanskrit) and 2. Gayakalochanam (Telugu).

The book 'Sangitasamayasara' was written by Parshvadeva around 1165 A. D. In it nearly 50 Talas have been furnished along with names, serial numbers and series of Talangas out of which nearly 10 serial numbers have been found incorrect.

The book 'Gayakalochanam' was written and published by Tacchoor Singaracharya Bros, in 1902. In it nearly 160 Talas have been furnished along with new names, serial numbers and series of Talangas out of which nearly 50 serial numbers have been found incorrect.

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All the above mentioned Talas are furnished here. In respect of the correct or in correct serial numbers of Talangas :

(a) they are shown in brackets if they were originally furnished contrarily than the required,

(b) the correct ones are shown just below the incorrect ones diagonally and

(c) the newly found correct ones are marked with an asterisk.

For example, in the Talas of 'Sangitasamayasara' :

(a) the 14th Tala 'Mattha' was originally furnished with the incorrect total value of the series of Talangas of 16–units instead of 8–units and so, the incorrect Talangas are shown within brackets.

(b) the serial number '71' and the respective series of Talangas 'S 0 0 0 0 S' of the 40th Tala 'Bindumali' contradict each other and so, the correct series of Talangas (0 1 1 0 0 0 S) of the corresponding serial number '71' and the correct serial number (74) of the corresponding series of Talangas 'S 0 0 0 0 S' are furnished just below diagonally and

(c) the corresponding series of Talangas of the 36th and 37th Talas 'Nandana and Shrikandarpa' respectively, which were not at all furnished originally in the text, but later found with the help of the easy method 'Nashta', are marked with an asterisk.

In the same manner other correct and incorect versions could be identified and understood.

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TĀLĀS FURNISHED IN "SANGĪTASAMAYASĀRA"

1.	Prati	- 5	-100 (4-units)
2.	Karaṇayati	- 6	-0000
3.	Rati	- 2	-IS (6-units)
4.	Darpaṇa	- 3	-00S
5.	Madana	- 4	-(00S)
			SI
6.	Hamsalīla	- 5	-ff
			III
7.	Kudukka	- 6	-00II
8.	Varṇa	- 15	-II00
9.	Shaṭ	- 19	-000000
10.	Rājamrigānka	- 2	-0IS (7-units)
11.	Simhalīla	- 13	-I000I
12.	Rājamārtāṇḍa	- 18	-SI0
13.	Chatu	- 18	-S000
		28	-SI0
14.	Maṭṭha	- 4	-(IISSII) (8-units)
			- IIS (also called Udēēkshaṇa)
15.	Lalita	- 5	-00IS (also called Varṇabhinna)
16.	Vīravikrama	- 7	-I00S
17.	Ranga	- 8	-0000S
18.	Gajalīla	- 13	-(IIII)
			IIII
19.	Rājavidyādhara	- 43	-IS00
20.	Mallikāmōda	- 56	-II0000
21.	Ānandavardhana	- 3	-00IS (10-units)
22.	Vishamakankāḷa	- 8	-ISS
23.	Khandakankāḷa	- 9	-(00S)
			00SS
24.	Ḍhenki	- 10	-SIS
25.	Mukunda	- 14	-I00IS
26.	Abhinandana	- 21	-II00S

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27.	Samakankāḷa	- 28	- S S I
28.	Pūrnakankāḷa	- 33	- 0 0 0 0 S I
29.	Tribhinna	- 2	- I S Ṡ (12-units)
30.	Ḳōkilapriya	- 3	- S I Ṡ
31.	Udghaṭṭa	- 8	- S S S
		6	- I 0 0 I Ṡ
32.	Tribhangi	- 7	- I I S S (also called Ratilcēla)
33.	Chāchaputa	- 10	- S I I S
34.	Kanduka	- 11	- I I I I S
35.	Śrīkīrti	- 19	- S S I I
36.	Nandana	- 18	- I 0 0 0 0 S*
37.	Śrīkandarpa	- 25	- 0 I 0 S S* (also called Parikrama)
38.	Tryaśravarṇa	- 33	- I 0 0 I I S
		35	- 0 0 I I I S
39.	Vanamāli	- 60	- 0 0 0 0 I 0 0 S
		46	- 0 0 0 0 0 I 0 S
40.	Bindumāli	- 71	- S 0 0 0 0 S
		74	- 0 I I 0 0 0 S
41.	Varṇayati	- 2	- I I Ṡ Ṡ (16-units)
42.	Chanchaputa	- 8	- S S I Ṡ
43.	Śrīranga	- 9	- I I S I Ṡ
44.	Vijayānanda	- 20	- I I S S S
45.	Śrōtrimaṭṭha	- 23	- S I I S S
46.	Simhanāda	- 28	- I S S I S
47.	Ananga	- 31	- I Ṡ I I S
48.	Jayamangaḷa	- 33	- I I S I I S
49.	Pratyanga	- 63	- S S S I I
50.	Hamsanāda	- 330	- I Ṡ 0 0 Ṡ
		132	- 0 0 0 I I 0 I I S
51.	Rājachūḍāmaṇi	- 450	- 0 0 I S I Ṡ
		30	- I 0 0 I 0 0 0 0 I S
52.	Shaṭpitāputraka	- 89	- Ṡ I S S I Ṡ (24-units)

* Angas were not furnished

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Tāla consisting of $1^1/_2$ -Mātrās (6-units):-

1. Naṭī - 1 - 0 1

Tālās consisting of 2-Mātrās (8-units):-

2. Naṭanī - 3 - 0 0 1
3. Nartana - 5 - 1 0 0

Tālās consisting of $2^1/_2$-Mātrās (10-units):-

4. Karamaṇī - 4 - 0 0 0 1
5. Jayaśrī - 1 - 0 S
6. Śrīkarī - 3 - 1 0 1

Tālās consisting of 3-Mātrās (12-units):-

7. Naṭanajnā - 3 - 0 0 S
8. Nāṭyamaṇi - 8 - 1 0 0 1
9. Naṭanamaṇi - 9 - 0 0 0 0 1

Tālās consisting of $3^1/_2$-Mātrās (14-units):-

10. Naṭanīmaṇi - 1 - 0 0 1 0 1
    11 - 0 S
11. Nāṭyajīvi - 3 - 1 0 S
12. Aūtvarita - 12 - 0 1 0 0 1
13. Pādadhvanī - 9 - S 0 1

Tālās consisting of 4-Mātrās (16-units):-

14. Janavinutā - 26 - 1 0 0 0 0 1
15. Vinōdanaṭanī - 25 - 0 1 0 0 0 1
16. Nartanapriyā - 20 - 1 0 1 0 1
17. Naṭanavinōdī - 8 - 0 0 0 0 S
18. Charaṇaghaṭṭanī - 21 - 0 0 0 1 0 1
19. Śringārakarī - 22 - S 0 0 1

Tālās consisting of $4^1/_2$-Matrās (18-units):-

20. Śrīkaḷāpriyā - 35 - 1 0 0 1 0 1
21. Nartanavinōdī - 12 - 1 0 0 0 S
22. Sadānādamaṇi - 37 - 0 S 0 0 1
23. Karadēsavasanī - 43 - 0 0 1 0 0 0 1
24. Charaṇayugadhvanī - 36 - 0 0 0 0 1 0 1
25. Janasammōdinī - 3 - 0 0 S 0 1
    30 - 0 0 0 S

Tālās consisting of 5-Mātrās (20-units):-

26. Śankarābhāḍinī - 55 - 1 0 S 0 1
27. Layaparigrāhinī - 56 - 0 0 0 S 0 1
28. Bharatamunīndravinutā - 181 - 0 0 0 0 1 0 0 0 0
29. Pādayugaghaṭṭanī - 65 - 1 0 0 0 1 0 1
30. Ghanṭānādamayī - 67 - S 0 0 1

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31. Karatāḍanadhvanī - 63 - 0010101
32. Nandivādyavibhrama - 151 - 1010100

Tālās consisting of 5½-Mātrās (22-units):-

33. Bhringīnaṭanapriyā - 111 - S00101
34. Arjunanirmitāngī - 32 - 10010S
35. Trilōkasanchāriṇī - 95 - 010S01
36. Vilasitapadachāriṇī - 116 - 000000101
37. Divyakusumasāyakī - 115 - 10000101
38. Nānājanakaramaṇi - 144 - S000001

Tālās consisting of 6-Mātrās (24-units):-

39. Rājēndrasammōdinī - 172 - S0S01
40. Naṭanādōmkāriṇī - 174 - 0010S01
41. Gandharvōpakāriṇī - 192 - (S0101) Ṡ0101
42. Chidambarēśwaranaṭanī - 258 - (01010001) 01010000 1
43. Vāsudēvānandinī - 166 - 10Ṡ01
44. Rasikajanānumōdinī - 200 - 00001010 1
45. Rājarājaprasangī - 49 - 10S0S
46. Kinnarabhāmādaraṇā - 217 - 100S001
47. Amarasannutajayaśrī - 73 - 0001000S
48. Mridangavādyānukūla - 365 - 010S010
49. Hamsānandagamanī - 252 - Ṡ00001

Tālās consisting of 6½-Mātrās (26-units):-

50. Mēnakātmajāpramōdinī - 343 - 10S0101
51. Vadhūjanāśrayadhīmaṇi - 361 - 0101001 01
52. Ānandōtsavadāyinī - 355 - Ṡ00101
53. Anangahridayāntarangī - 104 - 0100010S
54. Shadvidhanāṭyānukāriṇī - 293 - 100Ṡ01
55. Kāḷiyavishadharabhēdinī - 372 - 1000000101
56. Gangātarangaśikhariṇī - 455 - S0100001
57. Padayugavinyastamaṇi - 304 - 0000Ṡ01
294 - 0S0S01

Tālās consisting of 7-Mātrās (28-units):-

58. Rambhānāṭyānukūlinī - 613 - SS0101
59. Tāṇḍavasamprītikāriṇī - 617 - 100S0101
60. Agastyanirmitamōhinī - 552 - 01010S01
61. Śivakāmavaraprasādinī - 334 - 0010010101
634 - 010Ṡ11
62. Mēdinījanasantōshiṇī - 557 - 10100S01
63. Tripurāntakaprēmāmaṇi - 528 - 0010Ṡ01
64. Uttarakanyakābhyāsinī - 553 - 10010S01
65. Anādināṭyaprakāśinī - 616 - 010S0101
66. Sāhityarasānukūlinī - 632 - S0010101
67. Gajamukhanaṭanasamvardhanī - 564 - 0000000S01
68. Gajagāminīpādayukta - 155 - 0010S0S

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69. Kāntājanamanōhāriṇī - 559 - S O O O S O I
70. Purandaravaraprabhāmaṇi - 635 - O I O O O I O I O I

Tālās consisting of 7½-Mātrās (30-units):-

71. Virinchyānandasvarūpiṇī - 1093 - O S S O I O I
72. Gōpikākriḍāvilāsinī - 1091 - I O $ O I O I
73. Manmadhakēḷikāvilōlinī - 1124 - I O O I O I O I O I
74. Atikaṭhinanaṭanasvarūpiṇī - 1135 - O O O O O O O I O I O I
75. Vēṇugānasamyuktāmaṇi - 937 - I O I O $ O I
76. Munijanānandapradāyinī - 1092 - O O O $ O I O I
77. Sanakasanandanasamtōshiṇī - 994 - O O O O I O O S O I
78. Sangītaprabandhavardhanī - 1117 - $ O I O I O I

Tālās consisting of 8-Mātrās (32-units):-

79. Sarasvathīgaḷadvanamālinī - 2307 - O I O I O I O O I O I
2069 - I O $ O I O O I
80. Hastavinyastakramavādinī - 2306 - I O $ O O I O I
2037 - O I $ O I O O I
81. Nārāyaṇaśamkhānumōdinī - 1970 - S O O S O I O I
82. Gourīvallabhanirmitāmaṇi - 2017 - $ O O I O I O I
83. Ādibharatashāstrapraviṇatā - 1974 - I O O O O S O I O I
84. Īśvaraprasādajanitanipuṇā - 2711 - I O I O I O O O O O I
85. Tāṇḍavakrishṇa-nūrtyanaṭanabhara - 2680 - I O O I O I O O O O O I
86. Sundarāṅganāllāsyachāriṇī - 1968 - I O I O S O I O I
87. Nartakadhīḷanahṛidayaranjanī - 2130 - I O O I O O O O O I O I
88. Parabhīkarasvādhīnasulabhinī - 2582 - (O O I O O S O O O O)
O O I O O S O O O O I
89. Bhāmāmaṇipādavivardhanī - 630* - (S O O S O O S I)
S O O S O O S

(Note: The Laghu in the right extreme of 88th Tāla must have slipped down to the right extreme of 89th Tāla at the time of printing).

90. Dēvāsurāhlādōpachāriṇī - 466 - S O $ O S
91. Kēśavapadāmbhōjānusaraṇā - 2420 - I O O O $ O O O I
92. Kēraḷavanitāpādasarasijā - 2584 - I O O O O S O O O O I
93. Rāmālalāmapādachāriṇī - 2511 - S O I O I O I O I
2011 - O O S I O I O O O I

Tālās consisting of 8½-Mātrās (34-units):-

94. Induśēkharatāṇḍavāḍambarī - 3148 - I O I O O I O S O I
95. Rāvaṇahastavādyānurāgiṇī - 3517 - I O O I O S O I O I
96. Raṇajabhēriṇādyabhayamkarī - 3640 - O O O O $ O O I O I

Tālās consisting of 9-Mātrās (36-units):-

97. Tilōttamāṅghrisarōruhamōdinī - 6601 - O I O S O I O O I O I
98. Sangarapadaghaṭṭanaśṛingāriṇī - 5383 - I O O O O I O $ O I
99. Hanumadbharatalakshmaṇaprakāśinī - 6443 - O O I O O O I O I O I O I

Tālās consisting of 10-Mātrās (40-units):-

100. Viśvambharārpitākaraṭāḷaśōbhā - 5681 - S O I O S O I O $
101. Nāradādimunīndrahṛidayasammōdinī - 18344 - I O I O O I O O O S O I

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102.	Śṛṅgajagāminīpādāruṇabhēdakarī	- 24250	-IOOIOOSOOIOOI
		24105	-SSOOIOOIOOI
103.	Kāminījanapāñchālasyahridīmanī	- 21333	-IOIOOŚOOIOI
		20833	-OŚOSOOOIOI

Tālās consisting of 12-Mātrās (48-units):-

104.	Kalyāṇōtsavasamayōchitavarañāṭyakāriṇī	- 212685	-ŚOOOOIOOOOIOIOI
		212529	-IOOIOOOIOOOOOIOIOI
105.	Yamunātīravāsabhāmājanahridayamōdinī	- 222262	-OOSOIOSOOOOOIOI-

TĀLĀS PERTAINING TO TRISRA-JĀTI

(Could also be applied for Khanda, Miśra and Sankīrṇa Jāūs)

106.	Guṇī	- 2	-UO
107.	Guṇinī	- 3	-UUO
108.	Tāṇḍavaśrī	- 4	-OUI
109.	Naṭyajnabhūshaṇā	- 60	-IUOUO
110.	Dēvāsuramōdinī	- 99	-IUIUO
111.	Śṛingārinī	- 9	-IUO
112.	Surānandinī	- 15	-UIUO
113.	Naṭanapramōdā	- 11	-UUOUI
114.	Nāṭyavinōdā	- 5	-IUI
115.	Muniprasangī	- 6	-UOUI
116.	Kalyāṇaśīlāngī	- 4	-IUŚ
117.	Sadānandadāyinī	- 19	-UIUOUO
		109	-IOOI
118.	Mādhavāṅghrisarōruha	-	(386) -OUIUOU
			195
119.	Vārabhājanasammōdinī	-	1237 -OUIUUIUO
120.	Vēṇuvādyalīlāvinōdinī	-	3040 -OUOUIUOUO
			2518 -OUIUUOUUUO
121.	Gambhīravārāśitarangēshunāmnī	-	498 -IUIUUIUI
			1418 -OOIUOII
122.	Simhēndramadhyamabhūshaṇāngī	-	1449 -IUOUUUOUI
			927 -UIOIUIO
123.	Dundubhivādyamanī or Pakshirājēndrākrīḍ	-	2690 -OUŚUO
			2168 -IIOIUUO
124.	Paramēśanirmāṇanāmarūpī	-	9264 -UUOUSUOUO
			8742 -UUUOOUUUUUOUO
125.	Pārvatīmanōjātanāmakāriṇī	-	16479 -OUOUSUOUO
			16355 -UUUUUUOUIUOUO
126.	Trisramiśrakhaṇḍasankīrṇayukta	-	485 -OUOUOUIUI
			1405 -IOUOOII
127.	Bhīshaṇākārajanitānandānōtsava	-	7548211 -OUŚUUUUŚUO
			7446592 -UUOUUOUOOSIIUO
128.	Atyantasūkshmamādhyamakritīsumō	-	10464 -IUOUOUOUOUI
			10862 -UUUOUUUUUUOOUI
129.	Angajanāṭyānusaraṇākāramaṇī	-	1174 -OUUIUUUIUUO
			9612 -UOOUIUUII
130.	Vēdikāmadyalkākshariī	-	651 -OUIUIUO
131.	Gāruḍapakshīnāmamaṇī	-	9824 -OUUŚUUO
			9302 -UUOUUOOOOUUO
132.	Dēvēśādisurapramōdinī	-	3514 -ŚUUOUOUO
			31310 -UOOOUUUUOII

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133.	Brahmadēvanūrmīlākāramaṇi	-	93352 -OUOUOUŠUO
			92856 -OOUUOUUOSUO
134.	Dēvākritihamsukrīlmaṇi	-	1748 -OUUUIUUUO
			848 -UOIOOUUU
135.	Rāsakrīḍāvinōdinī-	-	383 -SUOUO
136.	Rājīvapushpamālākritisunādā	-	3029 -IUOUIUOUI
137.	Śrīkanṭhanāṭyamōdānukūlā	-	367 -IUSUI
138.	Kalhārasumamālākritisubhadrā	-	(7633) -IUUUSUUU
			5891
139.	Yantralōkālōkādivyāpārākāriṇī	-	26817 -OUSUSUO
			26693 -UOOOUUUSUO
140.	Jājīsukētakīmādhavīsupunnāgamālikāngi	-	244668 -IUOUIUOUIUOUI
			242910 -UUIIOOIOUOUI
141.	Śringārākāraśōbhitaśrīlakshmīkaṭākshavikshāmoudā	-	124467 -SSSOOUUUU
			6368486 -IUOOUUUUUUUOOUS
142.	Naṭanajanavajrāyudhā	-	1258 -UUUUUUUUIUO
143.	Karacharaṇaśabdākāramaṇi	-	27529 -UUUUUŠUUO
			17405 -OUOIUUUOOOU
144.	Suravarakinnaramunināutā	-	907 -UUUUOUUUUUO
145.	Bhīkaradanujamadaharaṇamusalā	-	5105 -OUUUUUUUUUUUUO
			6025 -OUOUOUIUUO
146.	Purandarapriyakriyābhēdanapramōdinī	-	203354 -UOUOUOUIUOUOUO
			204302 -OOIOUOOOUOUO
147.	Angāntarachaturaśra	-	51 -IUUUUI
148.	Mallayuddhasādhanapramōdā	-	2411 -OUOUOUOUI
			889 -OSOOUO
149.	Vikaṭamaṭajanakuṭharī	-	191 -UUUUUUUUUI
150.	Vishamanaṭanapratāpasēkharī	-	3861 -UUUUUOUOUOUO
			4781 -UUUUUOUOUUOO
151.	Jagadvijayataranaṭanaśēkharī	-	4046 -UOUUUUUUUUOUO
			4966 -UOUUUUUUUUUOO
152.	Vilāsalōlākaramaṇi	-	9823 -UOUŠUUO
			9301 -OOUUUOOOUUO
153.	Ativishadharauragēndrākāriṇī	-	49914 -UUUUUUUUŠUO
			49666 -UOUOUUUOSUO
154.	Praḷayakālōddaṇḍachaṇḍamārutākāriṇī	-	1207856 -UUUŠUOUOUIUO
			1206456 -IU OUUUOIUOOUIUO
155.	Śrīparamamunīndrahridayāhlādakāriṇī	-	58541 -OUUUUOUUUIUOUO
			57771 -OUOOUUOUOUOUO
156.	Sankrandanānandanavaraputrasaṁjīvanapriyā	-	733987 -IUUOUUUUOUUOUUOUO
			731163 -IIUUUUOUIUUUOUO
157.	Hamsaturangādidēvatāpriyā	-	3847 -OUUIUOUOUO
			4767 -OUUIUOUUOO
158.	Achyutanāṭyanrityanartanavichitralayabrahmajñānī	-	2874397 -OUUOUOUOUUUOUUSO
			2367841 -UUOUŠUOOUUUIO

X:—:X

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LIST OF EXAMPLES OF THE PROCESSES OF PERMUTATION

A. AKHANDA-PRASTARA

1. 2-6-19 - Table – 197
2. 2-7-33 – 198
3. 3-6-25 - Table – 199
4. 3-6-25 – 200
5. 4-7-31 – 201
6. 5-7-26 – 202
7. 7-8-36 – 203
8. 9-9-56 - 2 pages – 204 & 205
9. 0-6-32 - Table – 206
10. 0-6-32 – 207
11. 0-6-32 – 208

B. KHANDA - PRASTARA

1. 2- 9-1-1-28 – 209
2. 2-12-1-0-29 ,,
3. 2- 8-1-2-25 – 210
4. 2- 8-2-1-21 ,,
5. 3-10-1-1-32 – 211
6 3-12-1-0-23 ,,
7. 0- 8-1-1-26 – 212
8. 0- 8-1-0-13 ,,

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2-6-19

a	b	c						a	b	c					
		6	5	4	3	2	1			6	5	4	3	2	1
1	1						S	11	3/4					1	
2	4						S		6			0	1		
	5					1			7						0
	9					1	S		9			0	1	1	0
3	2/4					0		12	3/4				0		
	5				0				6			1			
	7						S		7					1	0
	9				0	0	S		9			1	0	1	0
4	3/4						1	13	2/4			0			
	6					S			5		0				
	9					S	1		7				0	1	0
5	2/4					1			9		0	0	0	1	0
	5				1			14	3/4					0	
	7						1		6				S		
	9				1	1	1		7						0
6	2/4				0				9				S	0	0
	5			0				15	2/4						
	7					1	1		5			1			
	9			0	0	1			7					0	0
7	3/4					0			9			1	1	0	0
	6			0	1			16	2/4			0			
	7						1		5		0				
	9			0	1	0	1		7				1	0	0
8	3/4				0				9		0	0	1	0	0
	6			1				17	3/4				0		
	7					0	1		6		0	1			
	9			1	0	0	1		7					0	0
9	2/4			0					9		0	1	0	0	0
	5		0					18	3/4			0			
	7				0	0	1		6		1				
	9		0	0	0	0	1		7				0	0	0
10	3/4						0		9		1	0	0	0	0
	6				0	S		19	2/4		0				
	9				0	S	0		5	0					
									7			0	0	0	0
									8/9	0	0	0	0	0	0

(a) Sankhya (b) Rule numbers to be followed (c) Columns in which Angas or figures are to be written

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									2	7	33										
33	1																			0	S
32	2																		0	1	S
31	3																		1	0	S
30	4																	0	0	0	S
29	5																		0	S	1
28	6																	0	1	1	1
27	7																	1	0	1	1
26	8																0	0	0	1	1
25	9																		S	0	1
24	10																	1	1	0	1
23	11																0	0	1	0	1
22	12																0	1	0	0	1
21	13																1	0	0	0	1
20	14															0	0	0	0	0	1
19	15	1																		S	0
18	16	2																	1	S	0
17	17	3																0	0	S	0
16	18	4																	S	1	0
15	19	5																1	1	1	0
14	20	6															0	0	1	1	0
13	21	7															0	1	0	1	0
12	22	8															1	0	0	1	0
11	23	9														0	0	0	0	1	0
10	24	10	1															0	S	0	0
9	25	11	2														0	1	1	0	0
8	26	12	3														1	0	1	0	0
7	27	13	4													0	0	0	1	0	0
6	28	14	5	1														S	0	0	0
5	29	15	6	2													1	1	0	0	0
4	30	16	7	3												0	0	1	0	0	0
3	31	17	8	4	1											0	1	0	0	0	0
2	32	18	9	5	2	1										1	0	0	0	0	0
1	33	19	10	6	3	2	1								0	0	0	0	0	0	0

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a	b	¢						a	b	¢						a	b	¢					
		6	5	4	3	2	1			6	5	4	3	2	1			6	5	4	3	2	1
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2	4						I		6			O					6			O			
	5					I			7					U	O		7					U	U
	9					I	!		9			O	U	U	O		9			O	O	U	U
3	2/4					O		12	2/4			U				21	2/4			U			
	5				U				5		U						5		U				
	7						I		7				U	U	O		7				O	U	U
	9				U	O	I		9		U	U	U	U	O		9		U	U	O	U	U
4	3/4					U		13	3/4						U	22	3/4				U		
	6				O				6				O	I			6			I			
	7						I		9				O	I	U		7					U	U
	9				O	U	I	14	2/4				U				9			I	U	U	U
5	2/4				U				5			U				23	2/4			O			
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	7					U	I		9			U	U	I	U		7				U	U	U
	9			U	U	U	I	15	3/4					O			9		U	O	U	U	U
6	3/4						O		6				I			24	3/4			U			
	6				U	I			7						U		6		O		U	U	U
	9				U	I	O		9					I	O	U	7						
7	3/4					O		16	2/4					O			9		O	U	U	U	U
	6				O				5			U				25	2/4		U				
	7						O		7					O	U		5	U					
	9				O	O	O		9			U	O	O	U		7			U	U	U	U
8	2/4				U			17	3/4				U				8/9	U	U	U	U	U	U
	5			U					6			O											
	7					O	O		7					O	U								
	9			U	U	O	O		9			O	U	O	U								
9	3/4					U		18	2/4			U											
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	9				I	U	O		9		U	U	U	O	U								
10	2/4				O			19	3/4					U									
	5			U					6			U	I										
	7					U	O		7						U								
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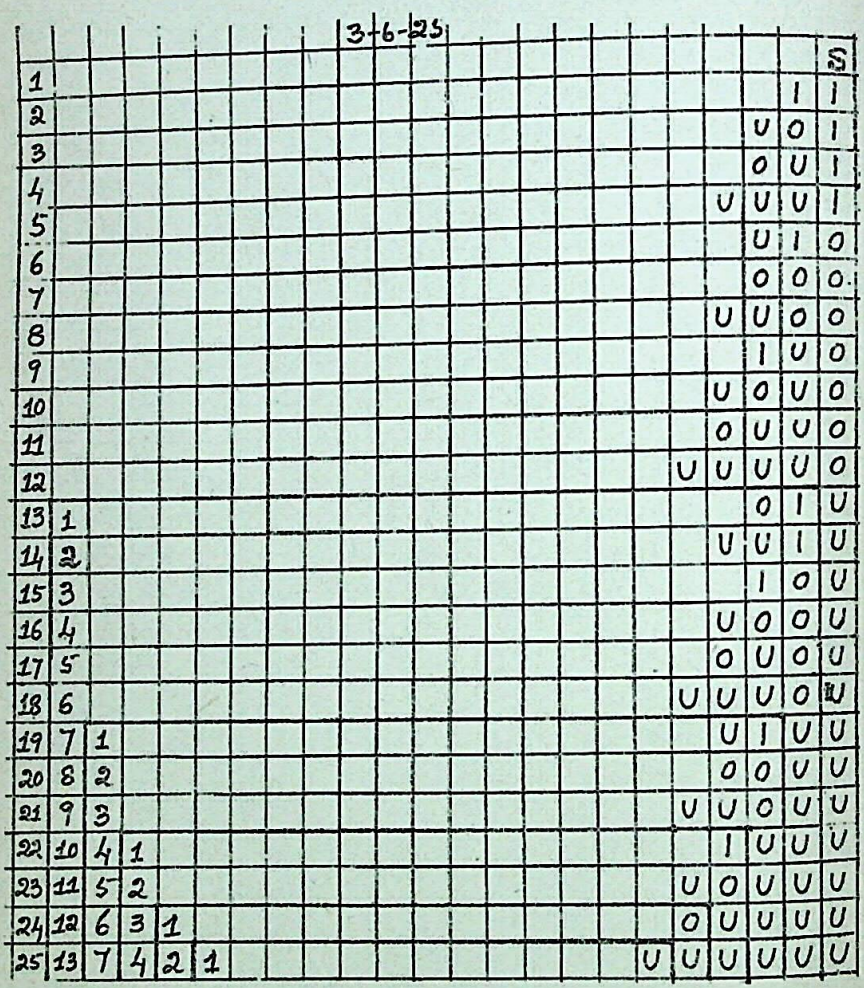

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4-7-31

1																				U	O	I
2																				O	U	I
3																			U	U	U	I
4																				U	I	O
5																			U	O	O	O
6																			O	U	O	O
7																		U	U	U	O	O
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9																			O	O	U	O
10																		U	U	O	U	O
11																		U	O	U	U	O
12																		O	U	U	U	O
13																	U	U	U	U	U	O
14	1																			O	I	U
15	2																		U	U	I	U
16	3																			I	O	U
17	4																		O	O	O	U
18	5																	U	U	O	O	U
19	6																	U	O	U	O	U
20	7																	O	U	U	O	U
21	8																U	U	U	U	O	U
22	9	1																	U	I	U	U
23	10	2																U	O	O	U	U
24	11	3																O	U	O	U	U
25	12	4															U	U	U	O	U	U
26	13	5	1																I	U	U	U
27	14	6	2															O	O	U	U	U
28	15	7	3														U	U	O	U	U	U
29	16	8	4	1													U	O	U	U	U	U
30	17	9	5	2	1												O	U	U	U	U	U
31	18	10	6	3	2	1										U	U	U	U	U	U	U

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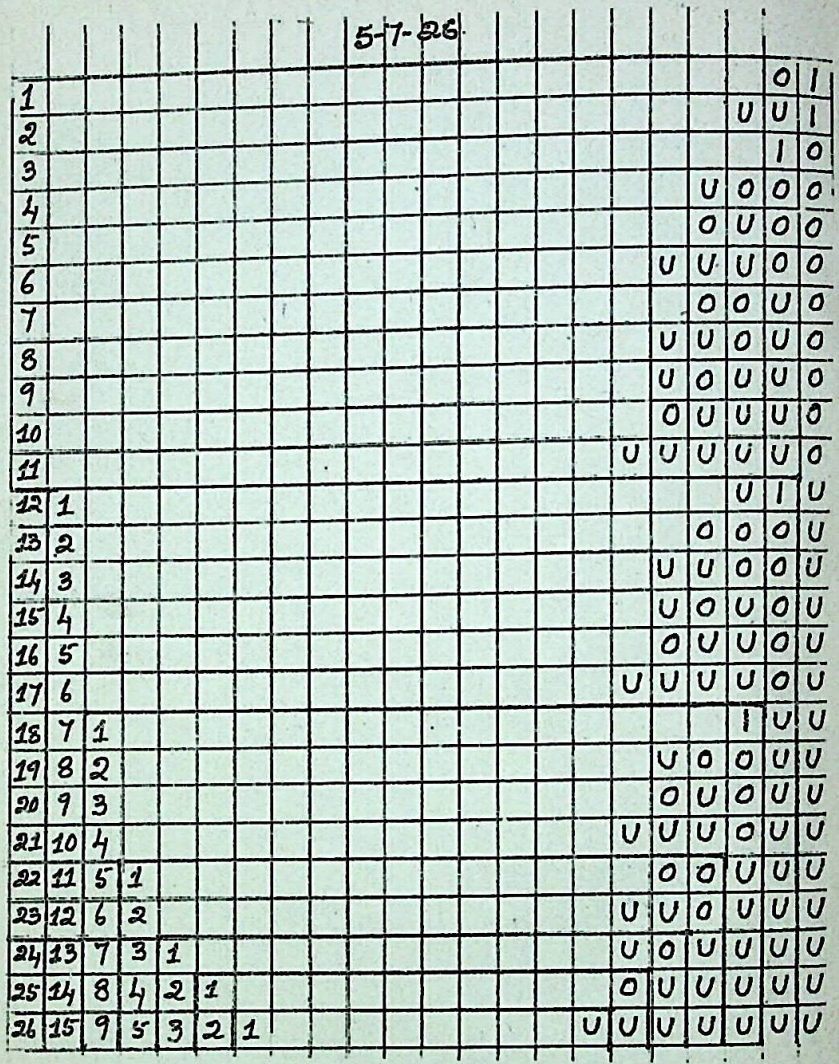

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									7-8-36												
1																				U	I
2																		O	O	O	O
3																	U	U	O	O	O
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5																	O	U	U	O	O
6																U	U	U	U	O	O
7																	U	O	O	U	O
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9																U	U	U	O	U	O
10																	O	O	U	U	O
11																U	U	O	U	U	O
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14															U	U	U	U	U	U	O
15	1																			I	U
16	2																U	O	O	O	U
17	3																O	U	O	O	U
18	4															U	U	U	O	O	U
19	5																O	O	U	O	U
20	6															U	U	O	U	O	U
21	7															U	O	U	U	O	U
22	8															O	U	U	U	O	U
23	9														U	U	U	U	U	O	U
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26	12	3														U	O	U	O	U	U
27	13	4														O	U	U	O	U	U
28	14	5													U	U	U	U	O	U	U
29	15	6	1													U	O	O	U	U	U
30	16	7	2													O	U	O	U	U	U
31	17	8	3												U	U	U	O	U	U	U
32	18	9	4	1												O	O	U	U	U	U
33	19	10	5	2											U	U	O	U	U	U	U
34	20	11	6	3	1										U	O	U	U	U	U	U
35	21	12	7	4	2	1									O	U	U	U	U	U	U
36	22	13	8	5	3	2	1							U	U	U	U	U	U	U	U

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204

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2				U	O	O	O	O
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5				O	O	U	O	O
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7			U	O	U	U	O	O
8			O	U	U	U	O	O
9		U	U	U	U	U	O	O
10				O	O	O	U	O
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12			U	O	U	O	U	O
13			O	U	U	O	U	O
14		U	U	U	U	O	U	O
15			U	O	O	U	U	O
16			O	U	O	U	U	O
17		U	U	U	O	U	U	O
18			O	O	U	U	U	O
19		U	U	O	U	U	U	O
20		U	O	U	U	U	U	O
21		O	U	U	U	U	U	O
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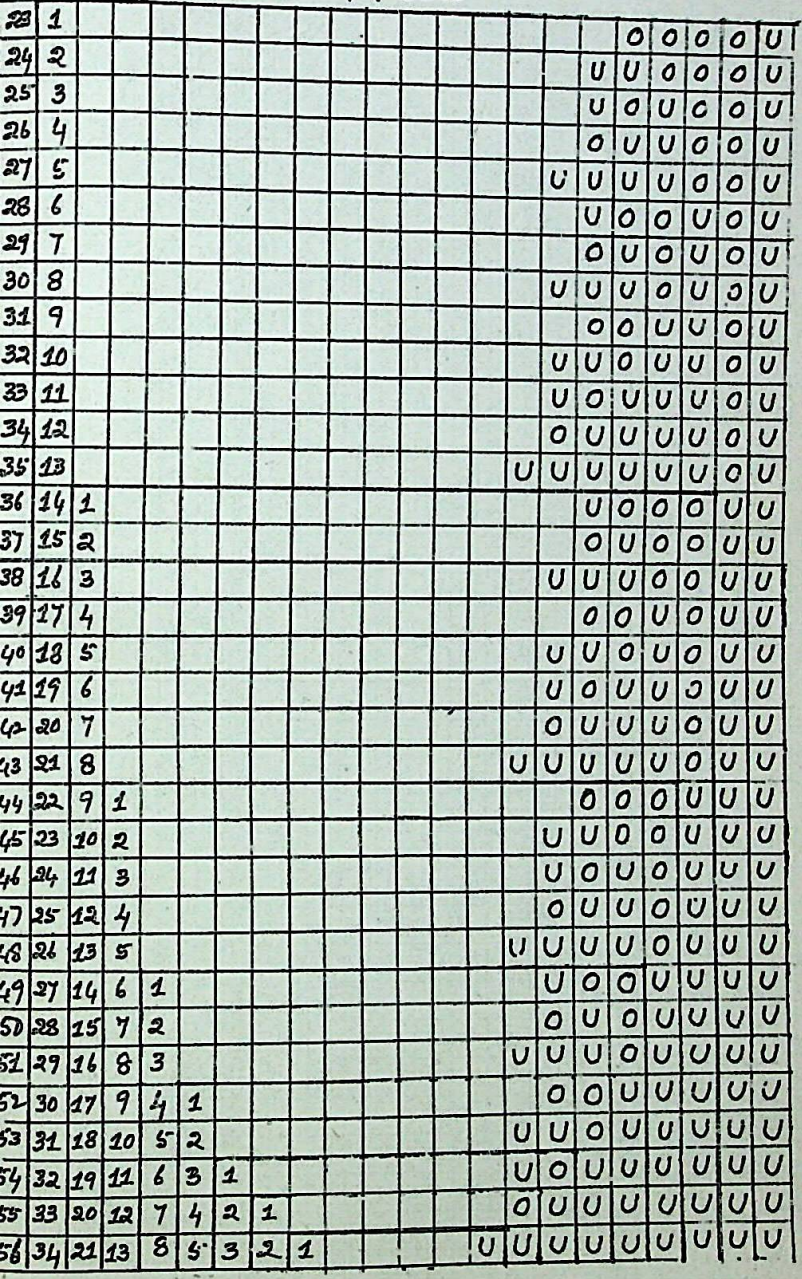
9-9-56(2)



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a	b	c						d	b	c						e	b	c					
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1	1						6	13	3/4					1		23	3/4				1		
2	4						5		6				3				6			2			
	5					1			7						2		7					2	1
	9					1	5		9				3	1	2		9			2	1	2	1
3	3/4						4	14	2/4				2			24	2/4			1			
	6					2			5			1					5		1				
	9					2	4		7					1	2		7				1	2	1
4	2/4					1			9				1	2	1		9		1	1	1	2	1
	5				1			15	3/4					1		25	3/4					1	
	7						4		6				2				6				4		
	9				1	1	4		7					1	2		7						1
5	3/4						3		9				2	1	1		9				4	1	1
	6					3		16	2/4				1			26	2/4				3		
	9					3	3		5			1					5			1			
6	2/4					2			7					1	1		7					1	1
	5				1				9			1	1	1	1		9			1	3	1	1
	7						3	17	3/4						1	27	3/4				2		
	9				1	2	3		6					5			6			2			
7	3/4					1			9					5	1		7					1	1
	6				2			18	2/4					4			9			2	2	1	1
	7						3		5				1			28	2/4			1			
	9				2	1	3		7						1		5		1				
8	2/4				1				9				1	4	1		7				2	1	1
	5			1				19	3/4					3			9		1	1	2	1	1
	7					1	3		6				2			29	3/4				1		
	9			1	1	1	3		7						1		6			3			
9	3/4						2		9				2	3	1		7					1	1
	6					4		20	2/4				1				9			3	1	1	1
	9					4	2		5			1				30	2/4			2			
10	2/4					3			7					3	1		5		1				
	5				1				9			1	1	3	1		7				1	1	1
	7						2	21	3/4					2			9		1	2	1	1	1
	9				1	3	2		6					3		31	3/4			1			
11	3/4					2			7						1		6		2				
	6				2				9					3	2	1	7				1	1	1
	7						2	22	2/4					2			9		2	1	1	1	1
	9				2	2	2		5				1			32	3/4			1			
12	2/4				1				7					2	1		5	1					
	5			1					9				1	2	2	1	7				1	1	1
	7					2	2										9	1	1	1	1	1	1
	9				1	1	2	2															

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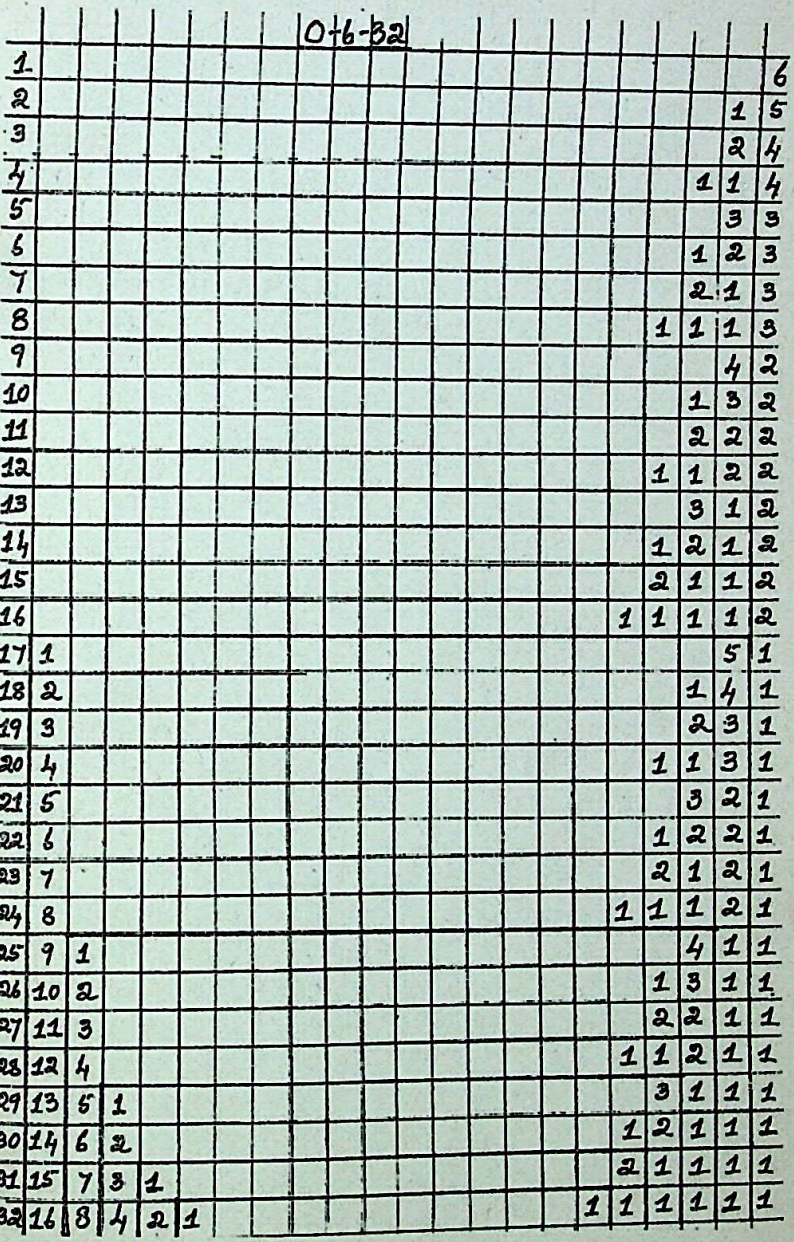

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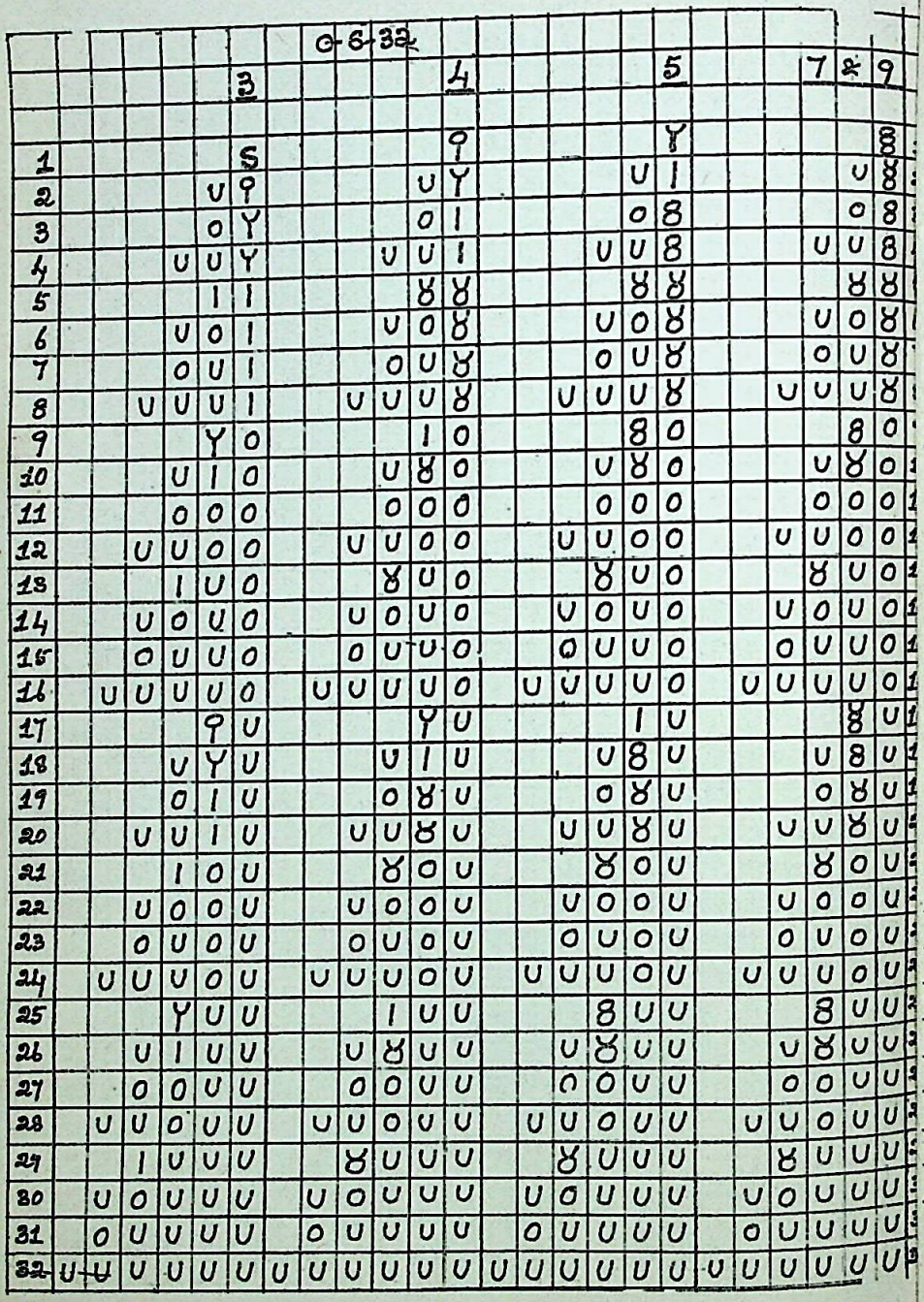

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			2	9	1	1	28											2	12	1	0	29
						0	+		1												S	+
					0	1	S		2											1	1	+
					1	0	S		3												S	S
					0	S	S		4											1	S	S
				0	1	1	S		5											S	1"	S
				1	0	1	S		6										1	1	1	S
					S	0	S		7												1	S
				1	1	0	S		8											1	S	S
					0	S	1		9											S	S	S
				0	1	S	1		10										1	1	S	S
				1	0	S	1		11											S	1	S
		1		0	S	1	1		12										1	S	1	S
			0	1	1	1	1		13										S	1	1	S
			1	0	1	1	1		14									1	1	1	1	S
				S	0	1	1		15	1										1	+	1
			1	1	0	1	1		16	2										S	S	1
					S	0	1		17	3									1	1	S	1
				1	S	0	1		18	4										S	S	1
				S	1	0	1		19	5									1	S	S	1
			1	1	1	0	1		20	6									S	1	S	1
						+	0		21	7								1	1	1	S	1
					1	S	0		22	8	1									+	1	1
					S	S	0		23	9	2								1	S	1	1
				1	1	S	0		24	10	3								S	S	1	1
					S	1	0		25	11	4							1	1	S	1	1
				1	S	1	0		26	12	5	1							S	1	1	1
				S	1	1	0		27	13	6	2						1	S	1	1	1
			1	1	1	1	0		28	14	7	3	1					S	1	1	1	1
									29	15	8	4	2	1			1	1	1	1	1	1

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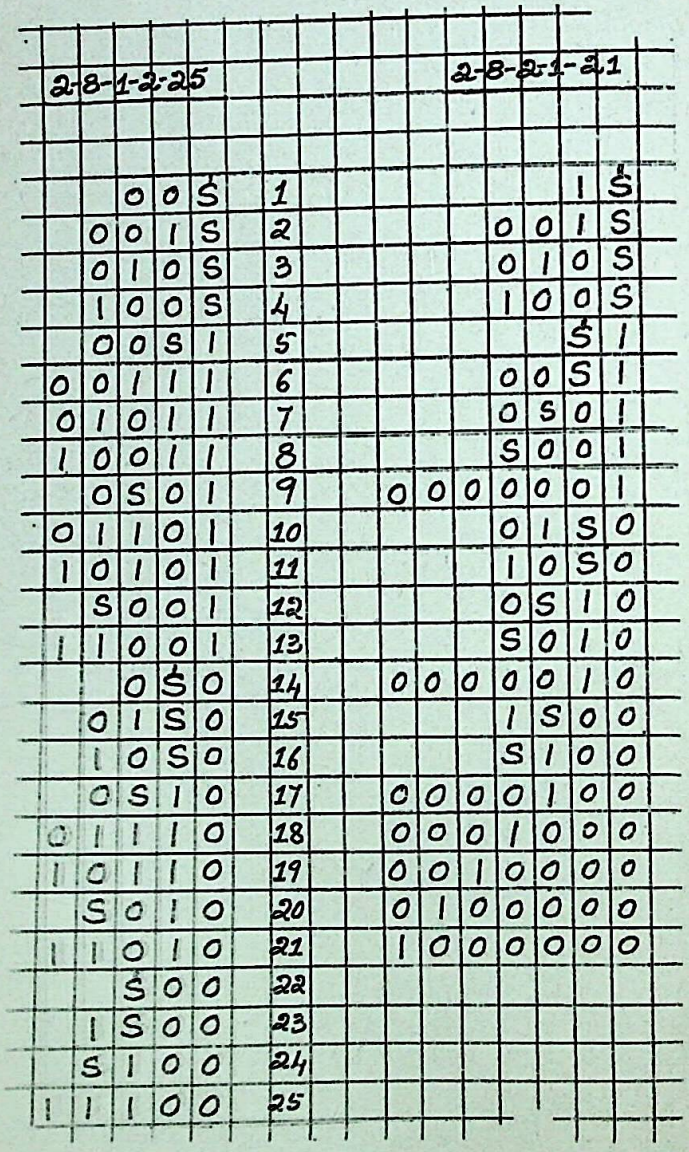

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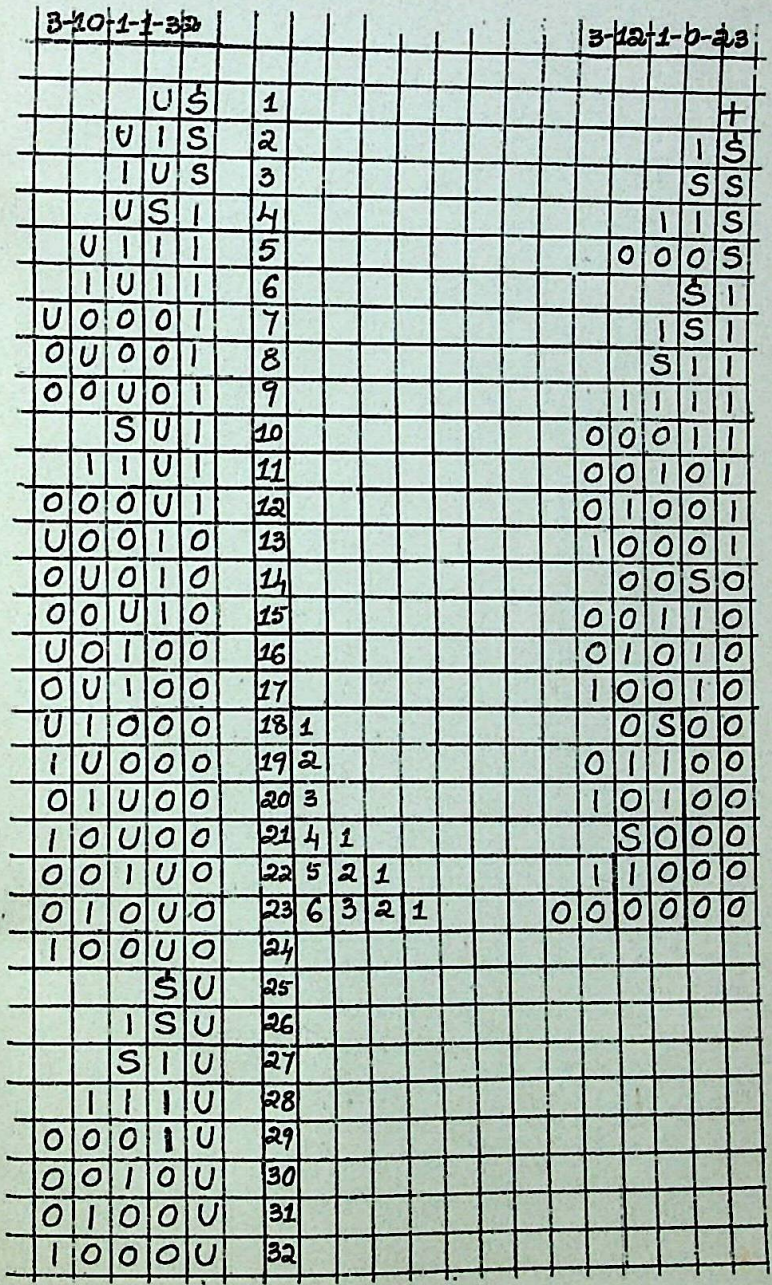

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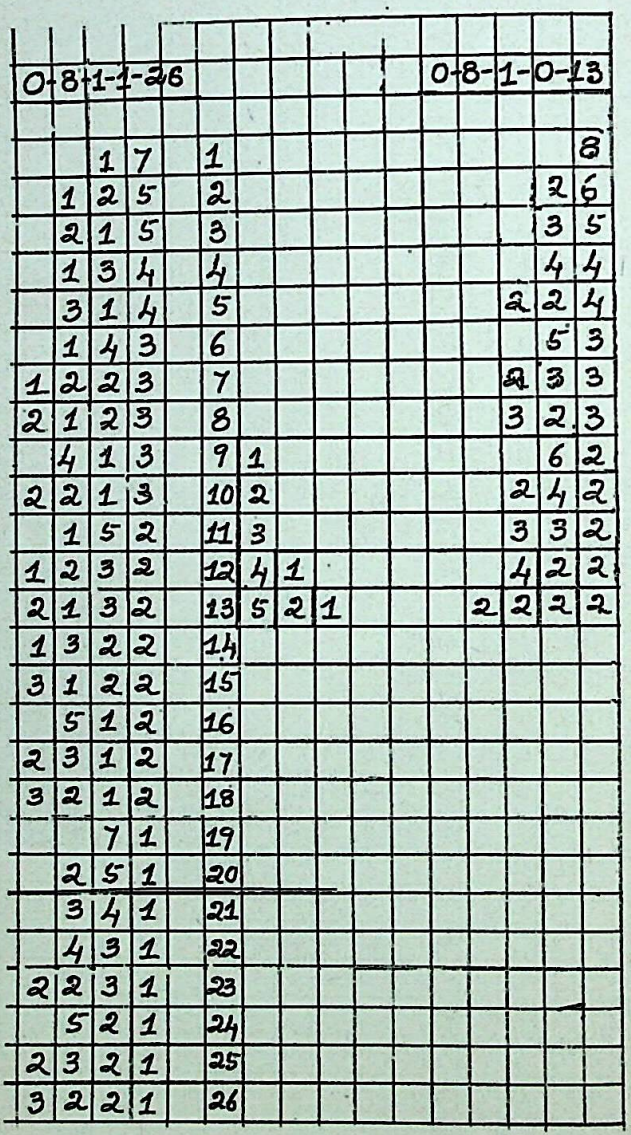

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1 6	2	63
2 5	3	62
1 1 5	4	61
3 4	5	60
1 2 4	6	59
2 1 4	7	58
1 1 1 4	8	57
4 3	9	56
1 3 3	10	55
2 2 3	11	54
1 1 2 3	12	53
3 1 3	13	52
1 2 1 3	14	51
2 1 1 3	15	50
1 1 1 1 3	16	49
5 2	17	48
1 4 2	18	47
2 3 2	19	46
1 1 3 2	20	45
3 2 2	21	44
1 2 2 2	22	43
2 1 2 2	23	42
1 1 1 2 2	24	41
4 1 2	25	40
1 3 1 2	26	39
2 2 1 2	27	38
1 1 2 1 2	28	37
3 1 1 2	29	36
1 2 1 1 2	30	35
2 1 1 1 2	31	34
1 1 1 1 1 2	32	33

	A	V
6 1	33	32
1 5 1	34	31
2 4 1	35	30
1 1 4 1	36	29
3 3 1	37	28
1 2 3 1	38	27
2 1 3 1	39	26
1 1 1 3 1	40	25
4 2 1	41	24
1 3 2 1	42	23
2 2 2 1	43	22
1 1 2 2 1	44	21
3 1 2 1	45	20
1 2 1 2 1	46	19
2 1 1 2 1	47	18
1 1 1 1 2 1	48	17
5 1 1	49	16
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2 3 1 1	51	14
1 1 3 1 1	52	13
3 2 1 1	53	12
1 2 2 1 1	54	11
2 1 2 1 1	55	10
1 1 1 2 1 1	56	9
4 1 1 1	57	8
1 3 1 1 1	58	7
2 2 1 1 1	59	6
1 1 2 1 1 1	60	5
3 1 1 1 1	61	4
1 2 1 1 1 1	62	3
2 1 1 1 1 1	63	2
1 1 1 1 1 1 1	64	1

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Serial Numbers of 35 Talas

			Panchanga			Shadanga						Samyuktanga					
			2	3	4	5	7	9	3	4	5	7	9
1.	Dhruva	—	1011 — 7 —	20	25	33	67	156 —	149	553	2129	33089	525569
2.	Mathya	—	101 — 3 —	5	5	5	5	5 —	21	41	81	321	1281
3.	Rupaka	—	01 — 1 —	1	1	1	1	1 —	3	3	3	3	3
4.	Jhampa	—	1U0 — — —	9	8	10	18	39 —	13	25	49	193	769
5.	Triputa	—	100 — 5 —	11	10	8	8	8 —	21	41	81	321	1281
6.	Ata	—	1100 — 15 —	71	85	110	233	555 —	71	649	2577	41025	655617
7	Eka	—	1 — 1 —	1	1	1	1	1 —	1	1	1	1	1

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LIST OF TABLES OF PERMUTATIONS

					Table of :
1.	Chaturashra-Jati	-	Panchanga-Prastara	-	General permutations
2.	-do-	-	-do-	-	Druta
3.	-do-	-	-do-	-	Laghu
4.	-do-	-	-do-	-	Guru
5.	-do-	-	-do-	-	Pluta
6.	-do-	-	-do-	-	Kakapada
7.	-do-	-	-do-	-	Combinative-Angas
8.	Trisra -jati	-	Shadanga-Prastara	-	General permutations
9.	-do-	-	-do-	-	Anudruta
10.	-do-	-	-do-	-	Druta
11.	-do-	-	-do-	-	Laghu
12.	-do-	-	-do-	-	Guru
13.	-do-	-	-do-	-	Pluta
14.	-do-	-	-do-	-	Kakapada
15.	-do-	-	-do-	-	Combinative -Angas
16.	Chaturashra -Jati		-do-	-	General permutations
17.	-do-	-	-do-	-	Anudruta
18.	-do-	-	-do-	-	Druta
19.	-do-	-	-do-	-	Laghu
20.	-do-	-	-do-	-	Guru
21.	-do-	-	-do-	-	Pluta
22.	-do-	-	-do-	-	Combinative -Angas
23.	Khanda-jati	-	-do-	-	General permutations
24.	-do-	-	-do-	-	Anudruta
25.	-do-	-	-do-	-	Druta
26.	-do-	-	-do-	-	Laghu
27.	-do-	-	-do-	-	Guru
28.	-do-	-	-do-	-	Combinative-Angas
29.	Mishra-jati	-	-do-	-	General permutations
30.	-do-	-	-do-	-	Anudruta
31.	-do-	-	-do-	-	Druta
32.	-do-	-	-do-	-	Laghu
33.	-do-	-	-do-	-	Combinative-Angas
34.	Sankeerna-Jati	-	-do-	-	General permutations
35.	-do-	-	-do-	-	Anudruta
36.	-do-	-	-do-	-	Druta
37.	-do-	-	-do-	-	Laghu
38.	-do-	-	-do-	-	Combinative-Angas
39.	Sarva-Jati	-	Samyuktanga-prastara	-	General permutations
40.	-do-	-	do-	-	One-unit
41.	-do-	-	-do-	-	Two-units
42.	-do-	-	-do-	-	Three-units
43.	-do-	-	-do-	-	Four-units
44.	-do	-	-do-	-	Five-units
45.	-do-	-	-do-	-	Six-units
46.	-do-	-	-do-	-	Seven-units
47.	-do-	-	-do-	-	Eight-units
48.	-do-	-	-do-	-	Nine-units
49.	-do-	-	-do-	-	Ten-units
50.	-do-	-	-do-	-	Eleven-units
51.	-do-	-	-do-	-	Twelve-units
52.	-do-	-	-do-	-	Combinative-units

53.Consolidated table of combinative units of 12-units' permutation pertaining to 2,3,4,5,7,9&0.

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		1	2	3	4	5	6	7	8	9	10	11	12	
1	1	1 1	2 3	3 7	6 16	10 34	19 72	33 147	61 279	108 576	196 1182	350 2316	632 4827	
	D	1	2	5	10	22	44	91	180	360	704	1378	2666	
	L	0	1	2	5	10	22	44	91	180	360	704	1378	
	G	0	0	0	1	2	5	10	22	44	91	180	360	
	P	0	0	0	0	0	1	2	5	10	22	44	91	
	K	0	0	0	0	0	0	0	1	2	5	10	22	
2													1 12	12
												1 11	0 0	11
											1 10	0 0	11 121	10
										1 9	0 0	10 100	0 0	9
									1 8	0 0	9 81	0 0	54 531	8
								1 7	0 0	8 64	0 0	44 388	0 0	7
							1 5	0 0	7 49	0 0	35 273	0 0	147 1253	6
						1 5	0 0	6 36	0 0	27 185	0 0	104 778	0 0	5
					1 4	0 0	5 25	0 0	20 115	0 0	70 450	0 0	225 1590	4
				1 3	0 0	4 16	0 0	11 66	0 0	14 236	0 0	129 771	0 0	3
			1 2	0 0	3 9	0 0	9 33	0 0	25 107	0 0	66 321	0 0	165 903	2
		1 1	0 0	2 4	0 0	5 13	0 0	12 38	0 0	28 104	0 0	62 248	0 0	1
	1	0 0	1 1	0 0	2 3	0 0	4 8	0 0	8 20	0 0	15 47	0 0	29 107	0

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	1	2	3	4	5	6	7	8	9	10	11	12	
13												1/6	6
										1/5	6/36	21/147	5
								1/4	5/25	15/90	35/245	75/585	4
						1/3	1/16	10/50	20/120	39/261	76/548	148/1132	3
				1/2	3/9	6/24	10/50	18/99	33/195	61/383	108/732	189/1368	2
		1/1	2/4	3/9	4/16	7/29	12/54	21/101	34/183	56/332	90/560	145/965	1
	1	1/1	1/2	1/3	2/5	3/9	5/16	7/27	11/45	16/74	24/121	35/195	53/314	0
14														
												1/3	3
								1/2	3/9	9/33	22/98	51/264	2
				1/1	2/4	5/13	10/34	20/82	38/181	73/399	136/836	255/1719	1
	1	1/1	2/3	3/7	5/15	8/30	14/59	23/113	40/215	67/403	114/750	192/1380	325/2531	0
15														
												1/2	2
						1/1	2/4	5/13	10/34	22/81	44/202	89/461	1
	1	1/2	2/3	3/7	6/16	10/34	18/71	31/143	56/286	98/562	174/1096	306/2114	542/4054	0
16														
								1/1	2/4	5/13	10/34	22/86	1
	1	1/1	2/3	3/7	6/16	10/34	19/72	33/147	60/298	106/598	191/1169	340/2282	610/4431	0

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	0	1	2	3	4	5	6	7	8	9	10	11	12
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2	1/1	1/1	01										
3	1/2	0/4	2/1	S									
4	1/3	1/2	3/1	1/1	0S								
5	1/4	0/25	1/1	0/1	2/4	1S	S						
6	1/5	1/3	1/49	0/9	3/9	2/4	1/1	0IS 0S					
7	1/6	0/142	2/0	0/11	1/4	3/0	0/0	6/18	2/4	1S +			
8	1/7	1/189	3/2	1/35	5/9	3/9	0/0	12/48	3/9	2/4	1/1	0IS 0+	
9	1/8	0/356	5/1	0/45	9/9	0/0	0/0	32/148	4/16	3/0	0/0	12/48	3/9
10	1/9	1/140	8/1	0/73	13/25	7/0	0/0	60/330	5/25	3/0	0/0	32/148	4/16
11	1/10	0/1153	14/3	0/114	18/0	0/0	0/0	134/802	6/36	0/0	0/0	148	0/0
12	1/11	1/2034	23/1	1/171	24/49	11/0	1/2	251/1693	7/49	1/16	0/0	60/330	5/25
	1/12	1/6	231/3	1/171	24/49	11/0	1/2	251/1693	7/49	1/16	0/0	60/330	5/25

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	1	2	3	4	5	6	7	8	9	10	11	12
1	1/1	2/3	4/8	7/19	13/43	25/95	46/204	86/421	162/900	302/1857	565/3799	1089/7748
A	1	2	5	12	26	56	120	250	517	1062	2159	4361
D	0	1	2	5	12	26	56	120	250	517	1062	2157
L	0	0	1	2	5	12	26	56	120	250	517	1062
G	0	0	0	0	0	1	2	5	12	26	56	120
P	0	0	0	0	0	0	0	0	1	2	5	12
K	0	0	0	0	0	0	0	0	0	0	0	1

												1/12	12
											1/11	0/0	11
										1/10	0/0	11/21	10
									1/9	0/0	10/100	10/102	9
								1/8	0/0	9/81	9/81	45/450	8
							1/7	0/0	8/64	8/64	36/324	72/648	7
						1/6	0/0	7/49	7/49	28/224	56/448	119/1029	6
					1/5	0/0	6/31	6/36	21/147	42/294	83/631	168/1314	5
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			1/3	0/0	4/16	4/14	10/50	20/100	34/183	60/360	115/705	184/1216	3
		1/2	0/0	3/9	3/9	6/24	12/48	19/83	30/150	57/288	85/467	141/837	2
	1/1	0/0	2/4	2/4	3/9	6/18	9/29	12/48	23/91	32/138	48/234	80/394	1
1	0/0	1/1	1/1	1/2	2/4	3/6	3/9	6/17	8/24	10/38	17/63	23/92	0

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		1	2	3	4	5	6	7	8	9	10	11	12	
10													1/2	6
											1/5	6/36	21/147	5
									1/4	5/25	15/90	10/370	100/740	4
							1/3	4/16	10/50	24/136	55/345	116/808	238/1802	3
					1/2	3/9	6/24	13/59	27/138	51/297	97/617	183/1257	333/2484	2
			1/1	2/4	3/9	6/20	11/43	18/64	32/117	56/310	93/573	158/1046	268/1898	1
	1	1/1	1/2	2/4	3/8	4/14	7/25	11/45	16/77	26/132	41/227	62/382	98/641	0
11													1/4	4
										1/3	4/16	14/66	40/320	3
							1/2	3/9	9/33	22/98	51/264	111/657	236/1558	2
				1/1	2/4	5/13	10/34	20/82	38/184	73/399	136/836	253/2115	466/3452	1
	1	1/1	2/3	3/7	5/15	8/30	14/59	23/113	39/214	66/400	111/741	187/1361	316/2484	0
12													1/2	2
							1/1	2/4	5/13	12/38	26/100	56/250	118/500	1
	1	1/1	2/3	4/8	7/19	13/43	24/94	44/200	81/328	150/862	276/1757	509/3549	940/7116	0
13										1/1	2/4	5/13	12/38	1
	1	1/1	2/3	4/8	7/19	13/43	25/95	46/204	86/431	161/899	300/1853	560/3786	1047/7680	0
14													1/1	1
	1	1/1	2/3	4/8	7/19	13/43	25/95	46/204	86/431	162/900	302/1857	565/3799	1088/7717	0

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U	1	2	3	4	5	6	7	8	9	10	11	12
1	0											
1	1	U01	1									
1	0	2	1	U1								
1	1	3	0	2	01							
1	0	7	0	3	2	U01	S					
1	1	11	1	4	0	6	1					
1	0	20	0	8	3	12	0	2	OS			
1	1	32	0	12	3	32	0	3	2	S		
1	0	54	1	17	4	72	0	4	0	6	2	1
1	1	87	0	27	6	152	0	5	3	12	0	0
1	0	143	0	40	9	311	0	6	0	32	0	0
1	1	231	1	58	10	625	1	7	1	60	3	0
1												

U	1	2	3	4	5	6	7	8	9	10	11	12
1												
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U	1	2	3	4	5	6	7	8	9	10	11	12
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U	1	2	3	4	5	6	7	8	9	10	11	12
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	1	2	3	4	5	6	7	8	9	10	11	12	
1	1 / 1	2 / 3	3 / 7	6 / 16	10 / 34	18 / 71	31 / 143	56 / 286	98 / 562	174 / 1096	306 / 2114	543 / 4055	
A	1	2	5	10	22	44	89	174	342	660	1270	2420	
D	0	1	2	5	10	22	44	89	174	342	660	1270	
L	0	0	0	1	2	5	10	22	44	89	174	342	
G	0	0	0	0	0	0	0	1	2	5	10	22	
P	0	0	0	0	0	0	0	0	0	0	0	1	

17

												1 / 12	12
											1 / 11	0 / 0	11
										1 / 10	0 / 0	11 / 121	10
									1 / 9		10 / 100	0 / 0	9
								1 / 8	0 / 0	1 / 81	0 / 0	54 / 531	8
							1 / 7	0 / 0	8 / 64	0 / 0	44 / 388	0 / 0	7
						1 / 6	0 / 0	7 / 49	0 / 0	35 / 273	0 / 0	140 / 1204	6
					1 / 5	0 / 0	6 / 36	0 / 0	27 / 183	0 / 0	98 / 748	0 / 0	5
				1 / 4	0 / 0	5 / 25	0 / 0	20 / 115	0 / 0	65 / 425	0 / 0	195 / 1410	4
			1 / 3	0 / 0	4 / 16	0 / 0	11 / 66	0 / 0	40 / 220	0 / 0	109 / 571	0 / 0	3
		1 / 2	0 / 0	3 / 9	0 / 0	9 / 33	0 / 0	22 / 98	0 / 0	54 / 273	0 / 0	123 / 705	2
	1 / 1	0 / 0	2 / 4	0 / 0	5 / 13	0 / 0	10 / 34	0 / 0	22 / 86	0 / 0	44 / 202	0 / 0	1
1	0 / 0	1 / 1	0 / 0	2 / 3	0 / 0	3 / 7	0 / 0	6 / 11	0 / 0	10 / 34	0 / 0	19 / 72	0

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											1/6	6
									1/5	6/36	21/147	5
							1/4	5/25	15/90	35/245	75/585	4
					1/3	4/16	10/50	20/120	39/241	76/548	144/1116	3
			1/2	3/9	6/24	10/50	18/99	33/195	58/374	96/684	159/1218	2
	1/1	2/4	3/9	4/16	7/29	12/54	19/97	28/164	42/274	70/460	109/767	1
1	1/1	1/2	1/3	2/5	3/9	4/15	5/23	8/36	12/58	17/92	23/141	34/213	0
											1/3	3
							1/2	3/9	9/33	22/98	51/214	2
			1/1	2/4	5/13	10/34	20/82	38/184	71/395	130/818	237/1653	1
1	1/1	2/3	3/7	5/15	8/30	13/58	21/109	35/202	57/369	94/668	154/1198	254/2135	0
							1/1	2/4	5/13	10/34	22/86	1
1	1/1	2/3	3/7	6/16	10/34	18/71	31/143	55/285	96/558	169/1083	296/2080	521/3969	0
											1/1	1
1	1/1	2/3	3/7	6/16	10/34	18/71	31/143	56/286	98/572	174/1096	306/2114	542/4054	0

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	U																								
1	1 1	0																							
2	1 2	1 1	UO																						
3	1 3	0 0	2 4	I																					
4	1 4	1 2	3 9	1 1	UI																				
5	1 5	0 0	7 25	0 0	2 4	OI																			
6	1 6	1 3	11 49	0 0	3 9	2 4	UOI																		
7	1 7	0 0	20 102	0 0	4 16	0 0	6 18	S																	
8	1 8	1 4	32 189	1 2	5 25	3 9	12 48	1 1	US																
9	1 9	0 0	54 356	0 0	9 45	0 0	32 148	0 0	2 4	OS															
10	1 10	1 5	87 640	0 0	13 73	7 25	60 330	0 0	3 9	2 4	UOS														
11	1 11	0 0	143 1153	0 0	18 114	0 0	134 802	0 0	4 16	0 0	6 18	IS	Ś												
12	1 12	1 6	231 2034	1 3	24 171	11 49	251 1693	0 0	5 25	3 9	12 48	2 4	1 1												

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	1	2	3	4	5	6	7	8	9	10	11	12
25 1	1	2	3	5	9	15	26	44	75	129	220	377
	1	3	7	15	31	62	122	235	447	842	1572	2916
A	1	2	5	10	20	40	77	148	279	522	971	1792
D	0	1	2	5	10	20	40	77	148	279	522	971
L	0	0	0	0	1	2	5	10	20	40	77	148
G	0	0	0	0	0	0	0	0	0	1	2	5

24

												1/12	12
											1/11	0/0	11
										1/10	0/0	11/121	10
									1/9	0/0	10/100	0/0	9
								1/8	0/0	9/81	0/0	15/450	8
							1/7	0/0	8/64	0/0	36/324	8/64	7
						1/6	0/0	7/49	0/0	28/224	7/49	84/756	6
					1/5	0/0	6/36	0/0	21/147	6/36	56/448	42/294	5
				1/4	0/0	5/25	0/0	15/90	5/25	35/245	30/180	70/560	4
			1/3	0/0	4/16	0/0	10/50	4/16	20/120	20/100	35/245	60/360	3
		1/2	0/0	3/9	0/0	6/24	3/9	10/50	12/48	15/90	30/150	30/180	2
	1/1	0/0	2/4	0/0	3/9	2/4	4/11	6/18	5/25	12/48	11/49	20/100	1
1	0/0	1/1	0/0	1/2	1/1	1/3	2/4	1/4	3/9	3/8	4/16	6/19	0

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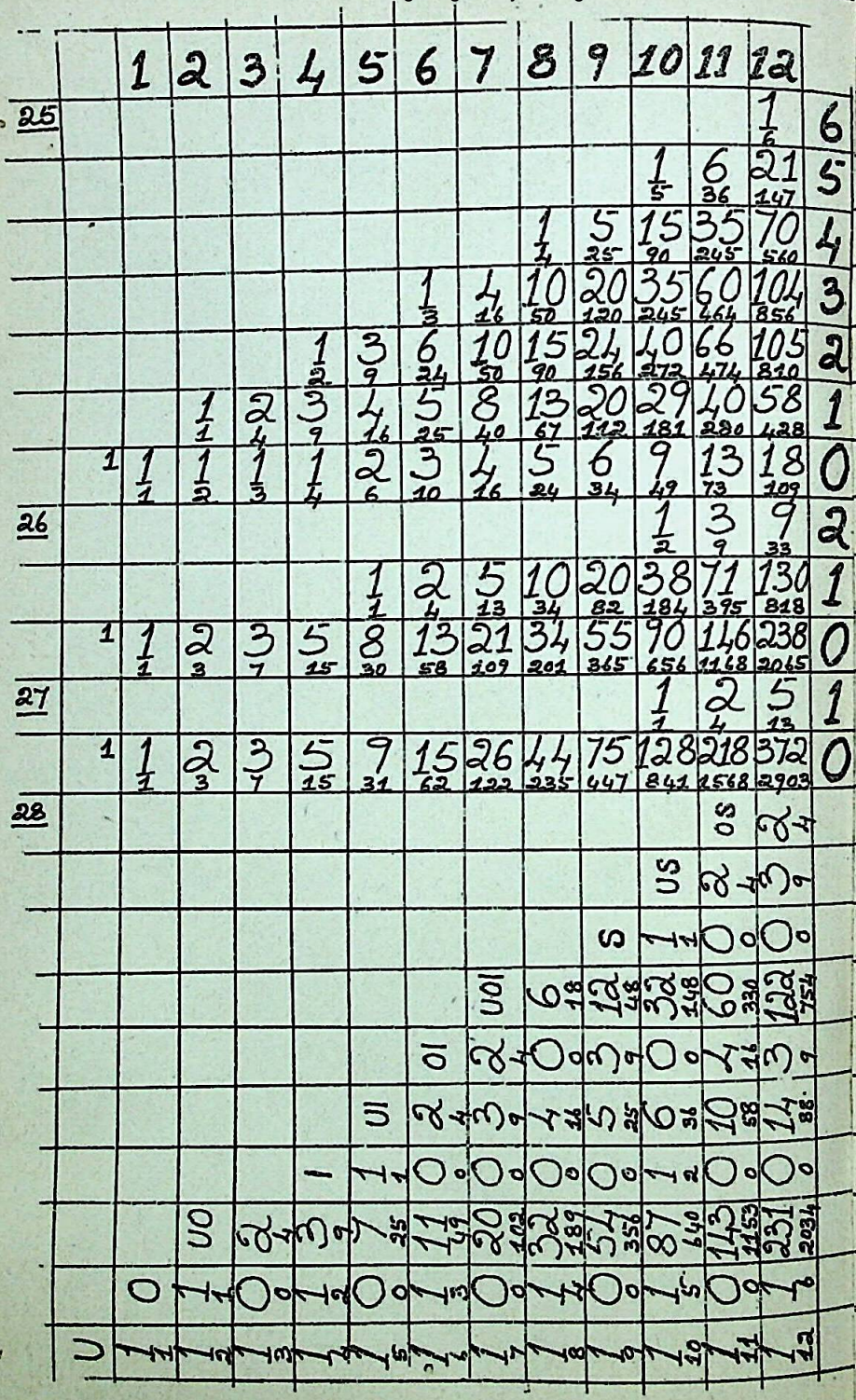

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29	1	1 / 1	2 / 3	3 / 7	5 / 15	8 / 30	13 / 58	22 / 110	36 / 205	60 / 378	99 / 689	164 / 1246	271 / 2236	
	A	1	2	5	10	20	38	71	132	241	438	788	1410	
	D	0	1	2	5	10	20	38	71	132	241	438	788	
	L	0	0	0	0	0	0	1	2	5	10	20	38	
30													1 / 12	12
												1 / 11	0 / 0	11
											1 / 10	0 / 0	11 / 121	10
										1 / 9	0 / 0	10 / 100	0 / 0	9
									1 / 8	0 / 0	9 / 81	0 / 0	45 / 450	8
								1 / 7	0 / 0	8 / 64	0 / 0	36 / 324	0 / 0	7
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						1 / 5	0 / 0	6 / 36	0 / 0	21 / 147	0 / 0	56 / 448	6 / 36	5
					1 / 4	0 / 0	5 / 25	0 / 0	15 / 90	0 / 0	35 / 245	5 / 25	70 / 560	4
				1 / 3	0 / 0	1 / 16	0 / 0	10 / 50	0 / 0	20 / 120	4 / 16	35 / 245	20 / 100	3
			1 / 2	0 / 0	3 / 9	0 / 0	6 / 24	0 / 0	10 / 50	3 / 9	15 / 90	12 / 48	21 / 147	2
		1 / 1	0 / 0	2 / 4	0 / 0	3 / 9	0 / 0	4 / 16	2 / 4	5 / 25	6 / 18	6 / 31	12 / 48	1
	1	0 / 0	1 / 1	0 / 0	1 / 2	0 / 0	1 / 3	1 / 1	1 / 4	2 / 4	1 / 5	3 / 9	1 / 6	0

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		1	2	3	4	5	6	7	8	9	10	11	12	
31													1/6	6
											1/5	6/36	21/147	5
									1/4	5/25	15/90	35/245	70/560	4
							1/3	4/16	10/50	20/120	35/245	56/448	84/756	3
					1/2	3/9	6/24	10/50	15/90	21/147	28/224	39/333	57/498	2
			1/1	2/4	3/9	4/16	5/25	6/36	7/49	10/68	15/99	22/148	31/221	1
	1	1/1	1/2	1/3	1/4	1/5	1/6	2/8	3/12	4/18	5/26	6/36	7/48	0
32								1/1	2/4	5/13	10/34	20/82	38/184	1
	1	1/1	2/3	3/7	5/15	8/30	13/58	21/109	34/201	55/365	89/655	144/1164	233/2052	0
33									01	2/4	0/0	3/9	0/0	
								UI	2/4	3/9	4/16	5/25	6/36	
							1	1/1	0/0	0/0	0/0	0/0	0/0	
			UO	2/4	3/9	7/25	11/49	20/102	32/189	54/356	87/640	143/1153	231/2034	
		0	1/1	0/0	1/2	0/0	1/3	0/0	1/4	0/0	1/5	0/0	1/6	
	U	1/1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	

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		1	2	3	4	5	6	7	8	9	10	11	12	
34	1	1	2	3	5	8	13	21	34	56	91	149	243	
		1	3	7	15	30	58	109	201	366	657	1177	2086	
	A	1	2	5	10	20	38	71	130	235	422	750	1328	
	D	0	1	2	5	10	20	38	71	130	235	422	750	
	L	0	0	0	0	0	0	0	0	1	2	5	10	
35													1 / 12	12
												1 / 11	0 / 0	11
											1 / 10	0 / 0	11 / 121	10
										1 / 9	0 / 0	10 / 100	0 / 0	9
									1 / 8	0 / 0	9 / 81	0 / 0	45 / 450	8
								1 / 7	0 / 0	8 / 64	0 / 0	36 / 324	0 / 0	7
							1 / 6	0 / 0	7 / 49	0 / 0	28 / 224	0 / 0	84 / 756	6
						1 / 5	0 / 0	6 / 36	0 / 0	21 / 147	0 / 0	56 / 448	0 / 0	5
					1 / 4	0 / 0	5 / 25	0 / 0	15 / 90	0 / 0	35 / 245	0 / 0	70 / 560	4
				1 / 3	0 / 0	4 / 16	0 / 0	10 / 50	0 / 0	20 / 120	0 / 0	35 / 245	4 / 16	3
			1 / 2	0 / 0	3 / 9	0 / 0	6 / 24	0 / 0	10 / 50	0 / 0	15 / 90	3 / 9	21 / 147	2
		1 / 1	0 / 0	2 / 4	0 / 0	3 / 9	0 / 0	4 / 16	0 / 0	5 / 25	2 / 4	6 / 36	6 / 18	1
	1	0 / 0	1 / 1	0 / 0	1 / 2	0 / 0	1 / 3	0 / 0	1 / 1	1 / 1	1 / 5	2 / 4	1 / 6	0

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	1	2	3	4	5	6	7	8	9	10	11	12	
36												1/6	6
										1/5	6/36	21/147	5
								1/1	5/25	15/90	35/245	70/540	4
						1/3	4/16	10/50	20/120	35/245	56/448	84/756	3
				1/2	3/9	6/24	10/50	15/90	21/147	28/224	36/324	45/450	2
		1/1	2/4	3/9	4/16	5/25	6/36	7/49	8/64	9/81	12/104	17/139	1
1	1/1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	2/10	3/14	4/20	5/28	0
37									1/1	2/4	5/13	10/34	1
1	1/1	2/3	3/7	5/15	8/30	13/58	21/109	34/201	55/365	89/155	144/1164	233/2052	0
38											1/1	6/18	
									1/1	2/4	3/9	7/16	
								1/1	0/0	0/0	0/0	0/0	
		1/2	2/4	3/7	7/25	11/49	20/102	32/189	54/357	87/140	143/1133	231/2034	
	0	1/1	0/0	1/2	0/0	1/3	0/0	1/4	0/0	1/5	0/0	1/11	
	1/1	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	

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	1	2	3	4	5	6	7	8	9	10	11	12
1	1 1	2 3	4 8	8 20	16 48	32 112	64 256	128 576	256 1280	512 2816	1024 6144	2048 13312
1	1	2	5	12	28	64	144	320	704	1536	3328	7168
2	0	1	2	5	12	28	64	144	320	704	1536	3328
3	0	0	1	2	5	12	28	64	144	320	704	1536
4	0	0	0	1	2	5	12	28	64	144	320	704
5	0	0	0	0	1	2	5	12	28	64	144	320
6	0	0	0	0	0	1	2	5	12	28	64	144
7	0	0	0	0	0	0	1	2	5	12	28	64
8	0	0	0	0	0	0	0	1	2	5	12	28
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11	0	0	0	0	0	0	0	0	0	0	1	2
12	0	0	0	0	0	0	0	0	0	0	0	1

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	1	2	3	4	5	6	7	8	9	10	11	12	i
												1/12	12
											1/11	0/0	11
										1/10	0/0	11/121	10
									1/9	0/0	10/100	10/100	9
								1/8	0/0	9/81	9/81	54/531	8
							1/7	0/0	8/64	3/64	44/338	80/712	7
						1/6	0/0	7/49	7/49	35/273	63/497	175/1477	6
					1/5	0/0	6/36	6/36	27/183	48/330	125/925	258/1768	5
				1/4	0/0	5/25	5/25	20/115	35/205	85/540	170/1120	360/2505	4
			1/3	0/0	1/4/26	4/16	11/66	24/116	54/286	104/576	209/1231	404/2496	3
		1/2	0/0	3/9	3/9	9/33	15/57	31/131	57/255	108/539	199/1013	366/1974	2
	1/1	0/0	2/4	2/4	5/13	8/20	15/47	26/88	46/170	80/313	139/595	240/1092	1
1	0/0	1/1	1/1	2/3	3/5	5/10	8/18	13/33	21/59	34/105	55/185	89/324	0

41

	1	2	3	4	5	6	7	8	9	10	11	12	i
												1/6	6
										1/5	6/36	21/147	5
								1/4	5/25	15/90	40/270	105/765	4
						1/3	4/16	10/50	24/136	59/361	140/924	318/2262	3
				1/2	3/9	6/21	13/59	30/147	66/354	139/815	288/1824	591/4008	2
		1/1	2/4	3/9	6/20	13/47	26/106	50/228	96/480	184/998	350/2048	661/4151	1
1	1/1	1/2	2/4	4/9	7/19	12/38	21/75	37/147	65/285	114/547	200/1042	351/1973	0

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1	2	3	4	5	6	7	8	9	10	11	12	
											1/1	4
								1/3	4/16	14/66	40/220	3
					1/2	3/9	9/33	22/98	54/273	126/714	270/1804	2
		1/1	2/9	5/23	10/51	22/86	46/201	97/425	201/1102	410/2170	832/5444	1
1	1/2	2/3	3/7	6/16	11/35	21/76	39/161	73/327	136/676	254/1425	474/2874	885/5840	0
											1/3	3
							1/2	3/9	9/33	25/107	63/312	2
			1/1	2/4	5/13	12/38	26/100	58/254	126/622	270/1482	575/3443	1
1	1/2	2/3	4/8	7/20	14/44	27/99	52/218	101/474	195/1017	377/2141	729/4555	1409/9534	0
									1/2	3/9	9/33	2
				1/1	2/4	5/13	12/38	28/104	62/268	138/670	302/1630	1
1	1/2	2/3	4/8	8/20	15/47	30/108	59/243	116/528	228/1176	449/2546	883/5445	1737/11149	0
											1/2	2
					1/1	2/4	5/13	12/38	28/104	64/272	142/684	1
1	1/1	2/3	4/8	8/20	16/48	31/111	62/252	123/563	244/1242	484/2712	960/5872	1905/12126	0
						1/1	2/4	5/13	12/38	28/104	64/272	1
1	1/1	2/3	4/8	8/20	16/48	32/112	63/255	126/572	251/1261	500/2778	996/6040	1984/13040	0

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	1	2	3	4	5	6	7	8	9	10	11	12	
47								1	2	5	12	28	1
								1	4	13	38	104	
	1	2	4	8	16	32	64	127	254	507	1012	2020	0
	1	3	8	20	48	112	256	575	1276	2803	6108	13208	
48									1	2	5	12	1
									1	4	13	38	
	1	2	4	8	16	32	64	128	255	510	1019	2036	0
	1	3	8	20	48	112	256	576	1277	2812	6131	13274	
49										1	2	5	1
										1	4	13	
	1	2	4	8	16	32	64	128	256	511	1022	2043	0
	1	3	8	20	48	112	256	576	1280	2815	6140	13299	
50											1	2	1
											1	4	
	1	2	4	8	16	32	64	128	256	512	1023	2046	0
	1	3	8	20	48	112	256	576	1280	2816	6143	13308	
51												1	1
												1	
	1	2	4	8	16	32	64	128	256	512	1024	2047	1
	1	3	8	20	48	112	256	576	1280	2816	6144	13311	

Dr. Urmila Sharma Collection, Varanasi

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52

1																							
1	2																						
1	1	1-2	3																				
1	0	2	1	1-3	4																		
1	1	3	0	2	1	1-4	2-3	5															
1	0	7	0	3	0	2	2	1	1-5	2-4	1-2-3	6											
1	1	11	1	4	0	3	0	0	2	2	6	1	1-6	2-5	3-4	1-2-4	7						
1	0	20	0	8	0	4	3	0	3	0	12	0	2	2	2	6	1						
1	1	32	0	12	1	5	3	0	4	3	32	0	3	0	0	12	0						
1	0	54	1	17	0	9	4	0	5	0	72	0	4	3	0	32	0						
1	1	87	0	27	0	13	6	1	6	7	152	0	5	0	3	60	0						
1	0	143	0	40	0	18	9	0	10	0	311	0	6	4	3	134	0						
1	1	231	1	58	1	24	10	0	14	11	625	1	7	3	0	251	0						
1	2	1	3	4	1	4	4	1	5	4	1	2	4	2	4	4	1						
1	0	4	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0						
1	1	9	0	4	1	1	0	0	1	0	0	0	1	0	0	0	0						
1	0	25	0	7	0	4	4	1	1	1	1	1	1	1	1	1	1						
1	1	49	2	16	0	9	0	0	4	4	13	1	1	1	1	1	1						
1	0	102	0	34	0	16	9	0	9	0	48	0	4	4	4	18	1						
1	1	189	0	60	2	25	9	0	16	9	148	0	9	0	0	48	0						
1	0	356	3	99	0	45	16	0	25	0	373	0	16	9	0	148	0						
1	1	640	0	170	0	73	24	2	36	25	904	0	25	0	9	330	0						
1	0	1155	0	278	0	114	41	0	58	0	2053	0	36	16	9	802	0						
1	1	2034	4	444	3	171	50	0	88	49	4527	2	49	9	0	1693	0						

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52 (contd)

1-7	2-6	3-5	1-2-5	1-3-4	8																	
2	2	2	6	6	1	1-8	2-7	3-6	1-2-6	4-5	1-3-5	2-3-4	9									8
4	4	4	18	18	1																	
3	0	0	12	12	0	2	2	2	6	2	6	6	1									9
9	0	0	48	48	0	4	4	4	18	4	18	18	1									
4	3	0	32	20	0	3	0	0	12	0	12	0	0									10
16	9	0	148	100	0	9	0	0	48	0	48	0	0									
5	0	3	60	42	0	4	3	0	32	0	20	12	0									11
25	0	9	330	228	0	16	9	0	148	0	100	48	0									
6	4	0	122	84	0	5	0	3	60	0	42	12	0									12
36	16	0	754	492	0	25	0	9	330	0	228	48	0									

(contd.. below)

1-9	2-8	3-7	1-2-7	4-6	1-3-6	1-4-5	2-3-5	1-2-3-4	10													
2	2	2	6	2	6	6	6	24	1	1-10	2-9	3-8	1-2-8	4-7	1-3-7	5-6	1-4-6	2-3-6	2-4-5	1-2-3-5	11	10
4	4	4	18	4	18	18	18	96	1													
3	0	0	12	0	12	12	0	60	0	2	2	2	6	2	6	2	6	6	6	24	1	11
9	0	0	48	0	48	48	0	300	0	4	4	4	18	4	18	4	18	18	18	96	1	
4	3	0	32	0	20	20	12	180	0	3	0	0	12	0	12	0	12	0	0	60	0	12
16	9	0	148	0	100	100	48	1020	0	9	0	0	48	0	48	0	48	0	0	300	0	

(contd.... below)

1-11	2-10	3-9	1-2-9	4-8	1-3-8	5-7	1-4-7	2-3-7	1-5-6	2-4-6	1-2-3-6	3-4-5	1-2-4-5	12								
2	2	2	6	2	6	2	6	6	6	6	24	6	24	1								12
4	4	4	18	4	18	4	18	18	18	18	96	18	96	1								

Dr. Urmila Sharma Collection, Varanasi

	1-1	2-6	2-5	1-2-5	1-3-4	8	1-8	2-7	3-6	1-2-6	4-5	1-3-5	2-3-4	7	
2	—	4/16	—	—	—	0/0	5/25	—	—	60/330	—	—	—	—	
3	—	4/16	—	—	—	—	—	—	3/9	60/330	—	—	—	0/0	
4	—	—	—	—	—	0/0	5/25	—	—	—	—	—	—	—	
5	—	—	—	122/754	—	—	—	—	—	—	—	—	—	—	
7	6/36	—	—	—	—	—	—	0/0	—	—	—	—	—	—	
9	—	—	—	—	—	—	—	—	—	—	—	—	—	0/0	
0	6/36	4/16	0/0	122/754	84/492	0/0	5/25	0/0	3/9	60/330	0/0	42/228	12/48	0/0	(contd in the next page)

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	1-9	2-8	3-7	1-2-7	4-6	1-3-6	1-4-5	2-3-5	1-2-3-4	10	1-10	2-9	3-8	1-2-8	4-7	1-3-7	5-6	1-4-6	2-3-6	2-4-5	1-2-3-5	11
2	—	3 (9)	—	—	0 (0)	—	—	—	—	—	—	—	—	12 (48)	—	—	—	12 (48)	—	—	—	—
3	4 (16)	—	—	—	—	20 (100)	—	—	—	—	—	0 (0)	—	—	—	—	—	—	0 (0)	—	—	—
4	—	3 (9)	—	—	—	—	—	—	—	—	—	—	—	12 (48)	—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—	—	—	0 (0)	3 (9)	—	—	—	—	—	—	—	—	—	—	—
7	—	—	—	32 (148)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	4 (16)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0	4 (16)	3 (9)	0 (0)	32 (148)	0 (0)	20 (100)	20 (100)	12 (48)	180 (1020)	0 (0)	3 (9)	0 (0)	0 (0)	12 (48)	0 (0)	12 (48)	0 (0)	12 (48)	0 (0)	0 (0)	60 (300)	0 (0)

(Contd. below)

	1-11	2-10	3-9	1-2-7	4-8	1-3-8	5-7	1-4-7	2-3-7	1-5-6	2-4-6	1-2-3-6	3-4-5	1-4-5	12		
2	—	—	—	—	2 (4)	—	—	—	—	—	6 (18)	—	—	—	—	—	632 (4517)
3	—	—	2 (4)	6 (18)	—	—	—	—	—	—	—	24 (96)	—	—	1 (1)	—	1059 (7718)
4	—	—	—	—	2 (4)	—	—	—	—	—	—	—	—	—	1 (1)	—	543 (4055)
5	—	2 (4)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	377 (2916)
7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	271 (2231)
9	—	—	—	6 (18)	—	—	—	—	—	—	—	—	—	—	—	—	243 (2086)
0	2 (4)	2 (4)	2 (4)	6 (18)	2 (4)	6 (18)	2 (4)	6 (18)	6 (18)	6 (18)	6 (18)	24 (96)	6 (18)	24 (96)	1 (1)	—	2048 (13312)

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